Portneuf River Subbasin

Addendum Implementation Plan for Agriculture

Photo provided by Portneuf Soil and Water Conservation District

(HUC# 17040208)

Prepared by the Idaho Soil and Water Conservation Commission

In cooperation with the Portneuf Soil and Water Conservation District, Caribou Soil Conservation District, Portneuf Watershed Partnership, Portneuf River Project, and U.S. Department of Agriculture – Natural Resources Conservation Service

June 2020

Original Plan: Idaho Soil Conservation Commission. December 2002. Portneuf River TMDL Agricultural Implementation Plan

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Introduction

The purpose of this plan is to assist local stakeholders in restoring beneficial uses within the Portneuf River Subbasin, through outlining the changes to the adaptive management approaches contained it the original Agricultural Implementation Plan (ISWCC, 2002).

Pursuant to section 39-3601 et seq., Idaho Code, and IDAPA 58.01.02, Water Quality Standards, the Idaho Soil & Water Conservation Commission (ISWCC) is the designated agency for the management of nonpoint source pollution on grazing and agricultural land in Idaho and is therefore responsible to lead TMDL implementation activities on grazing and agricultural land in the State.

The overall goal of this Implementation Plan is to help restore designated beneficial uses on impaired water-bodies by providing a framework, for which local stakeholders can use to reach the goals established in the TMDL. This Plan provides details of Best Management Practices (BMPs) needed to; achieve load reductions, outlines an adaptive management approach and schedule of these actions, and specifies monitoring needed to document actions and progress toward meeting water quality standards.

The major objective of this plan is to address the TMDL revisions and addendums for the Portneuf River Subbasin (2010), however, it does incorporate conservation efforts to reduce the pollutant load(s) entering these impaired waterbodies as recent as 2016. This plan will address pollutants from agricultural sources and a plan to reduce pollutant loads through the implementation of BMPs. Another objective is to outline a process by which BMP implementation and effectiveness will be monitored and the implementation plan revised if needed.

Descriptions and standards for all BMPs (NRCS Practices and Practice Codes) discussed in this plan can be located at the NRCS-Field Office Technical Guides (FOTG), located online at; https://efotg.sc.egov.usda.gov or at local NRCS offices.

Photo provided by Portneuf Soil and Water Conservation District

Project Setting

Overview of Subbasin Characteristics

Table 1: Summary of Subbasin Characteristics

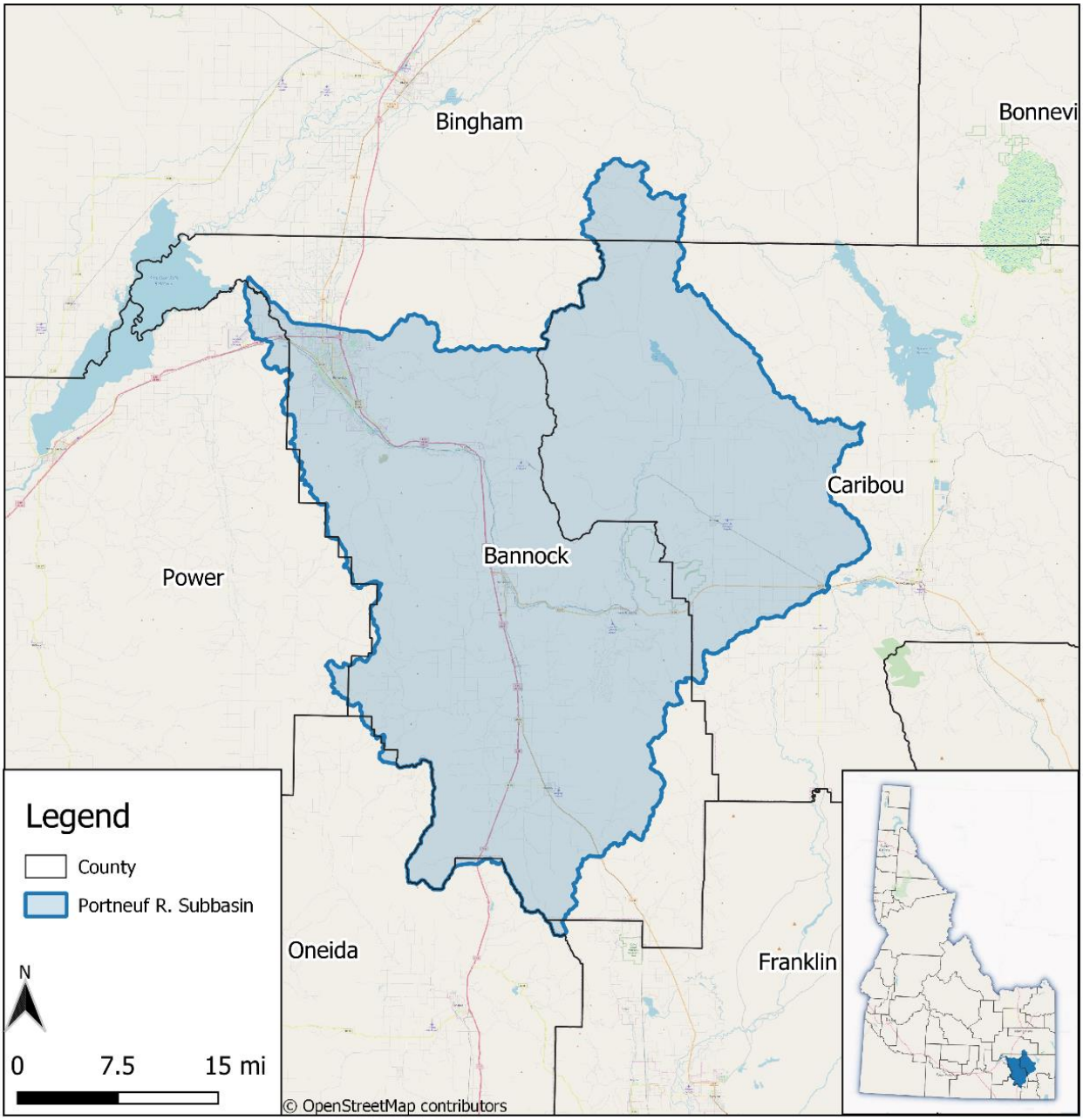
Hydrologic Unit Code (4th level)	17040208
Area	1,326.6 miles^2
Elevations	9,280 ft to 4,350 ft
Climate	Semiarid Mid-Latitude Steppe
Average Precipitation	12.7 inches
Average Temperature Range	
▪ July Maximum Average - 89.5°F to January Minimum Average - 17.9°F	
Water Quality Limited Assessment Units	
2008 §303(d)/305(b) Integrated Report[1]	
▪ 30 Total Segments (3 Mainstream Segments, 26 Tributary Assessment Units, 1 Reservoir)	
Pollutants of Concern identified in the 2008 §303(d)/305(b) Integrated Report	
▪ E. coli/fecal coliforms, Temperature, Dissolved Oxygen, Phosphorous, Nitrogen, and Sediment	
Beneficial Uses Affected	
▪ Cold Water Aquatic Life (CWAL), Primary (PCR) and Secondary Contact Recreation (SCR)	
Identified Point Sources	
▪ Wastewater Treatment Facilities, Municipalities, Storm Water Loading from Urbanized Areas (MS4 Permit), Fish Hatcheries	
Identified Nonpoint Sources	
▪ Agriculture/Grazing, Phosphorus Production Facilities, Runoff transporting wildlife, livestock, and pet feces, septic system discharges	

[1]This Implementation Plan also addresses the water quality limited assessment units identified in the 2002 and 1996 lists, as addressed in the Portneuf River TMDL Revision and Addendum (DEQ, 2010).

Location

The Portneuf River Subbasin is located in southeastern Idaho, mainly within Bannock, Caribou, and Bingham Counties; with a few portions of the watershed reaching into eastern Power County, northern Franklin and Oneida Counties as shown in Figure 1.

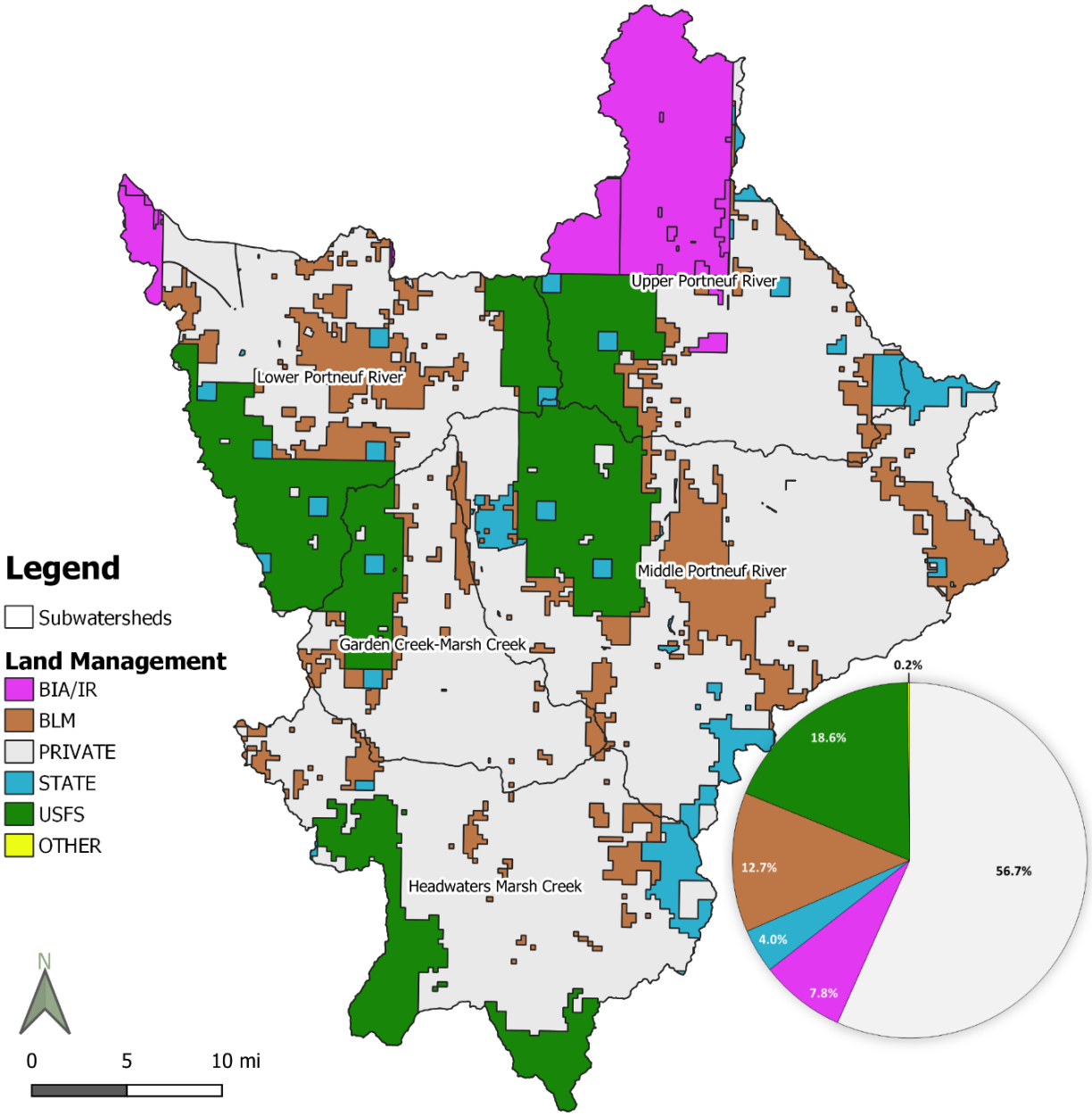
Figure 1: Location Map



Land Ownership

Land within the Subbasin is primarily privately and federally owned. Federally owned public lands are managed by the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS). The Fort Hall Indian Reservation managed by the Bureau of Indian Affairs is located in the northwestern portions of the Upper Portneuf River and Lower Portneuf River Subwatersheds. State-owned land parcels are dispersed throughout the Subbasin and primarily managed by the Idaho Department of Lands (IDL), with few areas managed by the Idaho Department of Fish and Game and Idaho Department of Parks and Recreation. Figure 2 shows the percentages and distributions of land management within the Subbasin.

Figure 2: Land Management

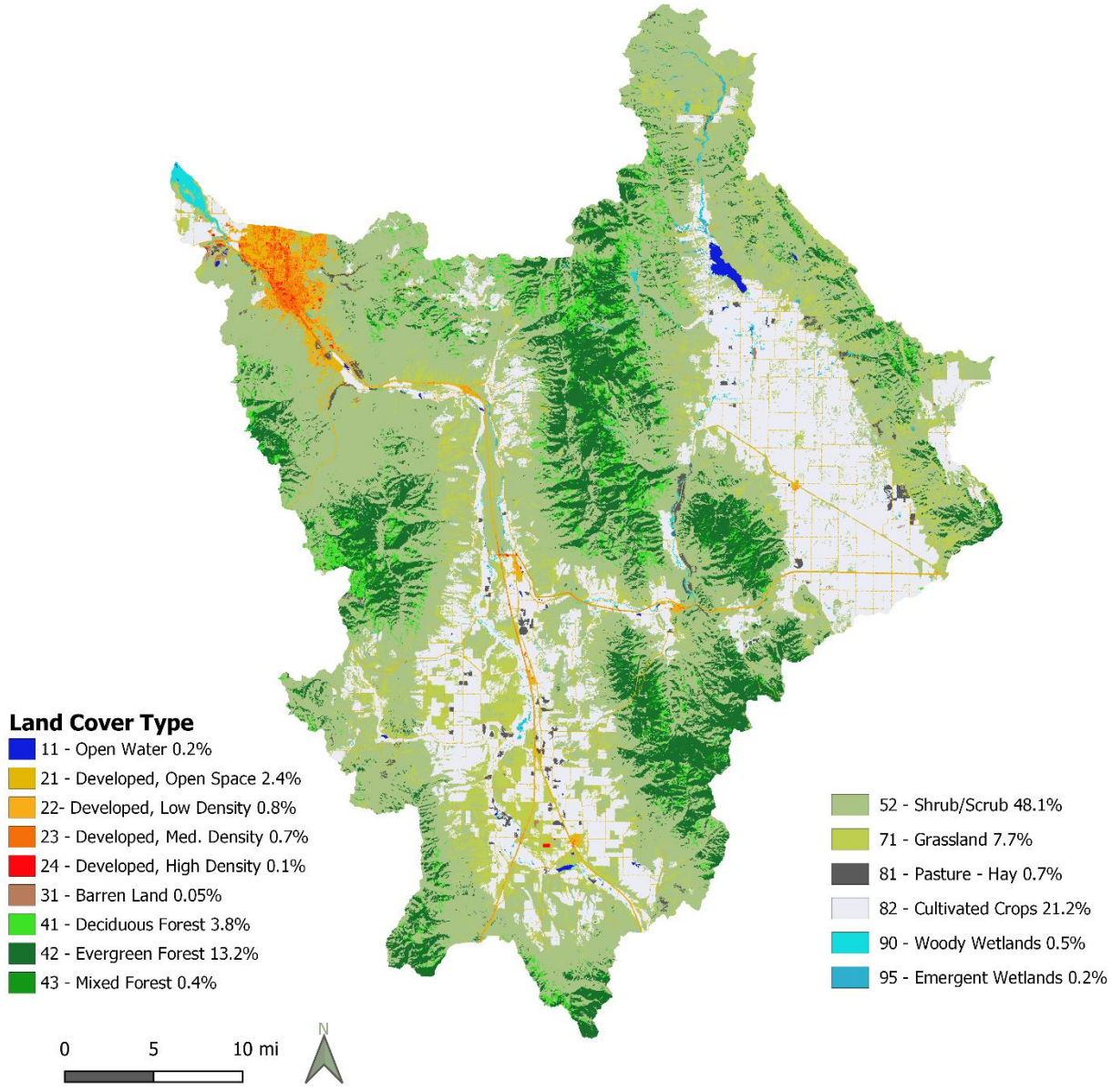


Land Use

Land Use on all Public and Private Ownership

Land use is closely correlated with landscape within the Subbasin. Valleys are dominated by urban development, agricultural land uses (irrigated/non-irrigated croplands, hay lands, and pastures) and some grasslands. Scrub/shrub plant communities, grasslands, and additional non-irrigated croplands cover large portions of mid-elevations (foothills and benches). Higher elevations contain most of the forested areas within the basin. Rangelands in the basin include large portions of the forestland, grassland, and scrub/shrub land cover types. Figure 3 shows land cover type distribution and total percentage area covered within the Subbasin.

Figure 3: Land Cover Type



(USGS, 2011)

Private Land Use

Private land ownership within the Subbasin comprises of approximately 57% of the land area or 477,332 acres. Table 2 shows the approximate percentage of land cover types within private lands in the Subbasin.

Table 2: Land Cover on Private Lands

Land Cover Type	% of Private Lands
Open Water	0.2%
Developed, Open Space-High Density	6.5%
Barren Land	0.1%
Forested	6.3%
Shrub/Scrub	38.8%
Grassland	10.4%
Pasture-Hay	1.2%
Cultivated Crops	35.9%
Wetlands	0.6%

Land Use Trends

Future urban sprawl is likely to encroach on private agricultural and grazing lands. Idaho is currently experiencing a population boom; between July 1, 2016 and July 1, 2017 the population has increased 2.2 percent, making it the fastest-growing state in the nation. (United States Census Bureau, 2017). Southeast Idaho, particularly the Lower Portneuf River Subwatershed, is experiencing this growth in population and the new housing and development that follows.

Accomplishments

The USDA – Natural Resources Conservation Service (NRCS), USDA-Farm Service Agency (FSA), Idaho Soil and Water Conservation Commission (ISWCC), and the Portneuf Soil and Water Conservation District (PSWCD) work with private landowners to implement voluntary conservation within the Subbasin on a variety of projects involving conservation planning and implementing Best Management Practices (BMPs). Research from Idaho State University has shown that conservation programs like the Conservation Reserve Program (CRP) significantly reduced sediment loads in the Marsh Valley. "Flow-normalized suspended sediment flux dropped by 75% over the past 45 years. Dollars spent on conservation projects have had measurable improvements in water quality seen 6 to 7 years later." (Meese, 2018). Portneuf SWCD identified no-till (residue & tillage management practices) as one of the primary BMPs that have reduced sediment and phosphorus loads that lead to delisting. Table 3 contains a summary of conservation activities and practices (along with USDA practice code #'s) that were implemented by private landowners, NRCS, FSA, and ISWCC between 2006 and 2016 on private agricultural lands in the Subbasin, organized by land use.

Table 3: Identified BMP's Implemented within the Subbasin, 2006-2016

Riparian

- 182 ac. Brush Management (314)
- 36,143ft. Fence (382)
- 1 ac. Riparian Herbaceous Cover (390)
- 1 ac. Riparian Forest Buffer (391)
- 2.3 ac. Filter Strip (393)
- 10 ac. Stream Habitat Improvement and Management (395)
- 8.6 ac. Access Control (472)
- 482 acres Forage and Biomass Planting (512)
- 18,364 ft. Livestock Pipeline (516)
- 987 ac. Prescribed Grazing (528)
- 5 Pumping Plants (533)
- 164 ac. Heavy Use Area Protection (561)
- 6 Spring Developments (574)
- 2 Stream Crossings (578)
- 385 ft. Streambank and Shoreline Protection (580)
- 2,262 ft. Channel Bed Stabilization (584)
- 4 Structures for Water Control (587)
- 42 ac. Integrated Pest Management (595)
- 8.1 ac. Tree/Shrub Establishment (612)
- 22 Watering Facilities (614),
- 4 Water Wells (642)
- 10 ac. Wetland Wildlife Habitat Management (644)
- 60.8 ac. Wetland Enhancement (659)
- 5 ac. Extending Existing Field Borders for Water Quality Protection and Wildlife Habitat (ANM07)
- 8,506.7 acres Managing Livestock Access to Waterbodies/courses (WQL12)
- 34.5 acres Use Exclusion (472)

Animal Facilities

- 7 Comprehensive Nutrient Management Plans (100)
- 5 Waste Storage Facilities (102)
- 141,457 ft. Fence (382)
- 9,306 ft. Livestock Pipeline (516)
- 2 Pumping Plants (533)
- 124.5 ac. Heavy Uses Area Protection (561)
- 27 ac. Nutrient Management (590)
- 13 Watering Facilities (614)
- 4 Water Well (642)

Cropland & Pasture

- 32,774 ac. pest management BMPs (315, 595, AIR07, WQL01)
- 4560.7 ac. Deep Tillage (324)
- 54,221.5 ac Conservation Cover (327)
- 7,132.1 ac. Conservation Crop Rotation (328)
- 10,735.3 ac. Residue and Tillage Management Practices (329, 329A, 329B, 344, 345)
- 3,554.8 ac. Contour Farming (330)
- 180.3 ac. Prescribed Burning (338)
- 36.2 ac. Cover Crop (340)
- 1,717.3 ac. Critical Area Planting (342)
- 13,022 ft. Windbreak/Shelterbelt Establishment (380)
- 92,825 ft. Fence (382)
- 252,740.8 ft. Irrigation Pipeline (430)
- 2,434.5 ac. Irrigation/Sprinkler Systems (441, 442)
- 6,045.4 ac. Irrigation Water Management (449)
- 34,836.3 ac. Access Control (472)
- 2 ac. Mulching (484)

- 987.1 ac. or Forage and Biomass Planting (512)
- 53,273.1 ft. Livestock Pipeline (516)
- 11,679 ac. Prescribed Grazing (528)
- 30 Pumping Plants (533, 2625)
- 1 ac. Heavy Use Area Protection (561)
- 2 Spring Developments (574)
- 20 Structures for Water Control (587)
- 5,447.4 ac. Nutrient Management practices (587, WQL04, WQL06)
- 17,695 ft. Terrace (600)
- 62.9 ac. Surface Roughening (609)
- 55 Watering Facilities (614)
- 36 Water and Sediment Control Basins (638)
- 22 Water Wells (642)
- 1174.2 ac. Resource-Conserving Crop Rotation (CCR99)
- 8,460.2 ac. Rotation of Supplement and Feeding Areas (WQL03)

Rangeland

- 797.7 ac. Brush Management (314)
- 64.6 ac. Herbaceous Weed Control (315)
- 1 ac. Channel Bank Vegetation (322)
- 60,194 ft. Fence (382)
- 19.3 ac Sprinkler System (442)
- 5 ac. Access Control (472)
- 40 ac. Forage and Biomass Planting (512)
- 32,872 ft. Livestock Pipeline (516)
- 25,916.1 ac. Prescribed Grazing (528)
- 3 Pumping Plants (533)
- 246.5 ac. Range Planting (550)
- 1.5 ac. Heavy Use Area Protection
- 11 Spring Developments (574)
- 5,657.8 ac. Integrated Pest Management (595)
- 27 Watering Facilities (614)
- 2 Water Wells (642)
- 7,506.1 ac. Monitoring Key Grazing Areas to Improve Grazing Management (PLT02)
- 14,662.5 ac. of Rotation of Supplement and Feeding Areas.

Other or Unknown Land Uses

- 327 ac. of Conservation Cover (327)
- 4940 ft. of Fence (382)
- 33 ac. of Field Border (386)
- 6 ac. of Prescribed Grazing (614)

Pollutants of Concern

The Portneuf River TMDL Revision and Addendum identified bacteria (E. coli), sediment, nutrients (Total P and N), oil and grease, and dissolved oxygen as pollutants of concern. Table 4 lists the pollutants of concern addressed in the 2010 report (DEQ, 2010) by waterbody and Figures 4-8 display their distribution throughout the Subbasin.

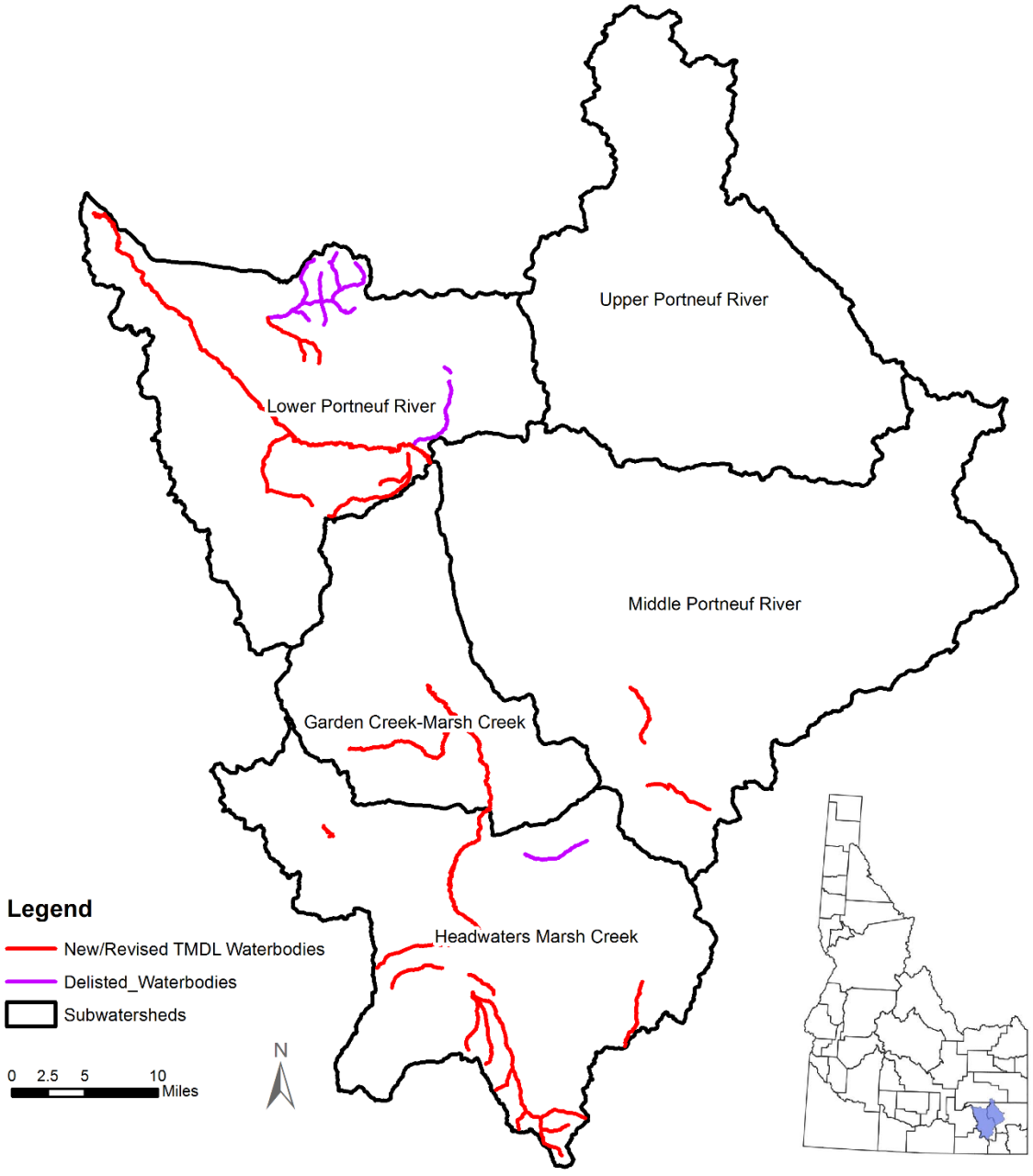
Table 4: List of Waterbodies containing Assessments Units (AUs) for which TMDLs were added or delisted

Waterbodies	Pollutants of Concern					
	Bacteria (E. coli)	Sediment (TSS)	Total Phosphorus (TP)	Total Nitrogen (TN)	Oil and Grease	Dissolved Oxygen (DO)
Cherry Creek ephemeral tributaries	↑	↓	↓	↓	-	-
Cherry Creek	↑	↓	↓	↓	-	-
Dempsey Creek (lower)	↑	-	-	-	-	-
Beaverdam Creek	-	↑	-	-	-	-
Garden Creek (lower)	↑	-	-	-	-	-
Indian Creek	↑	-	-	-	-	-
Marsh Creek	↑	↑	↑	↑	-	-
Yago Creek	-	↓	-	-	-	-
Kinney Creek	-	↑	-	-	-	-
Mink Creek	↑	-	-	-	-	-
Portneuf River	↑	↑	↑	-	↑	-
South Fork Pocatello Creek	-	↑	-	-	-	-
North Fork Pocatello Creek	-	↓	-	-	-	-
North Fork Pocatello Creek tributaries	-	↓	-	-	-	-
Hawkins Reservoir	-	-	↑	↑	-	↑

(DEQ, 2010)

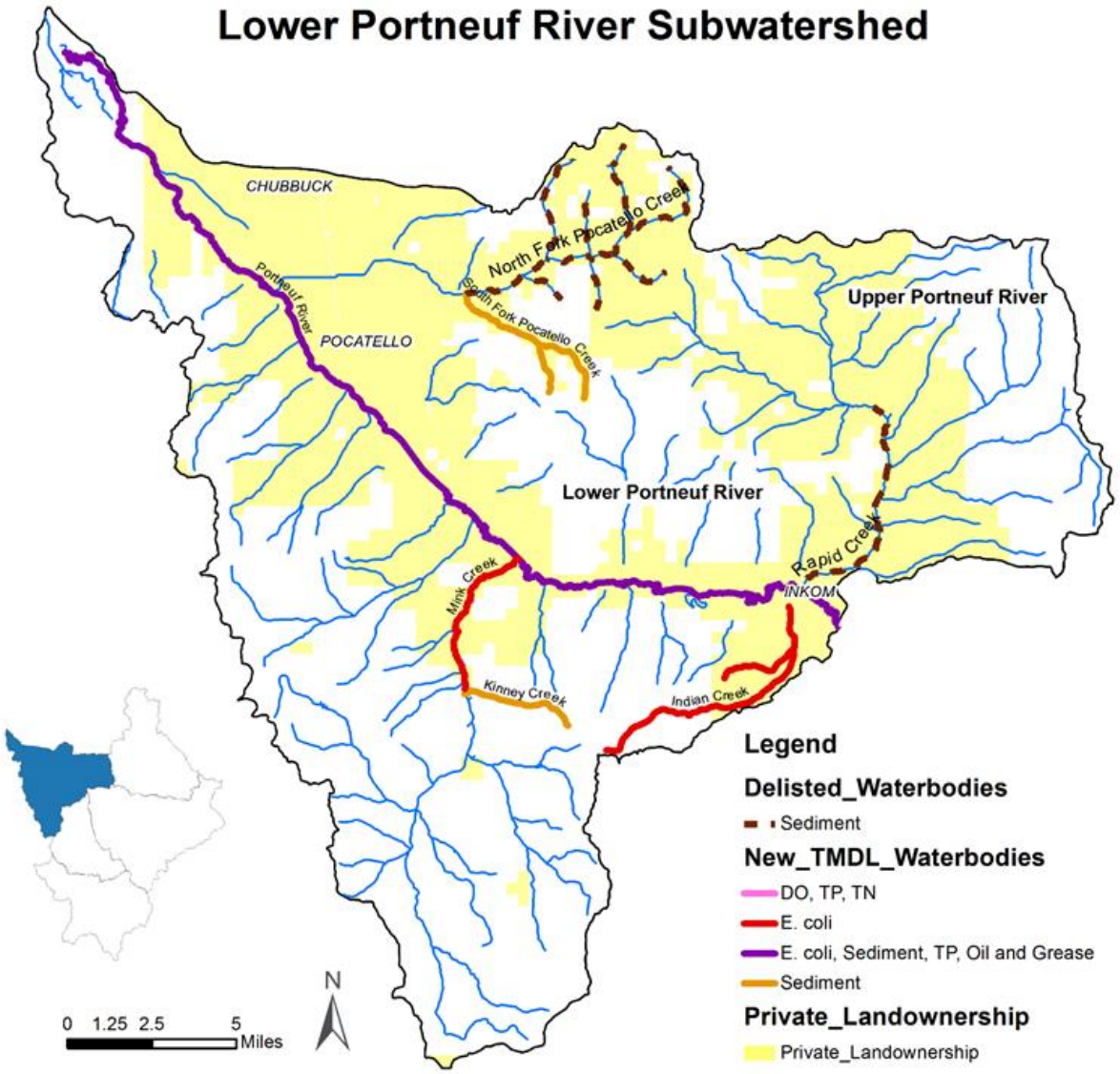
Note: (↑) TMDLs developed, (↓) Waterbodies Delisted in the Portneuf River TMDL Revision and Addendum, and (-) denotes No Change from the 1999 & 2001 Subbasin Assessment and TMDL. Specific segments, assessment units, and delisted waterbodies/pollutants are listed within the Portneuf River TMDL Revision and Addendum, (IDEQ, 2010). See Figures 2-5 for visual representations of the waterbodies/assessment units.

Figure 4: Assessment Units for which TMDLs were added or delisted



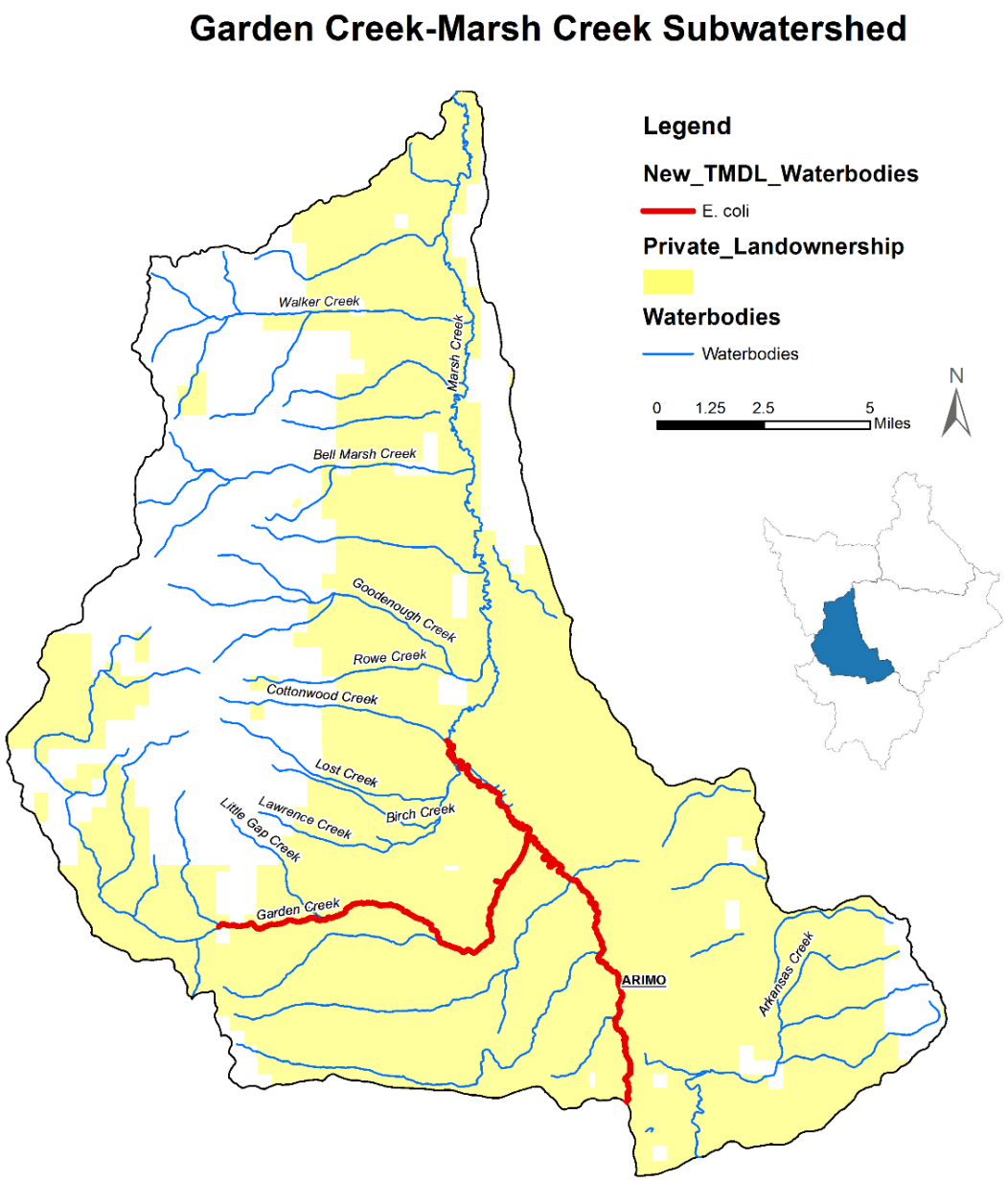
(DEQ, 2010, p. xxxii)

Figure 5: Lower Portneuf River Subwatershed added TMDLs and delisted waterbodies



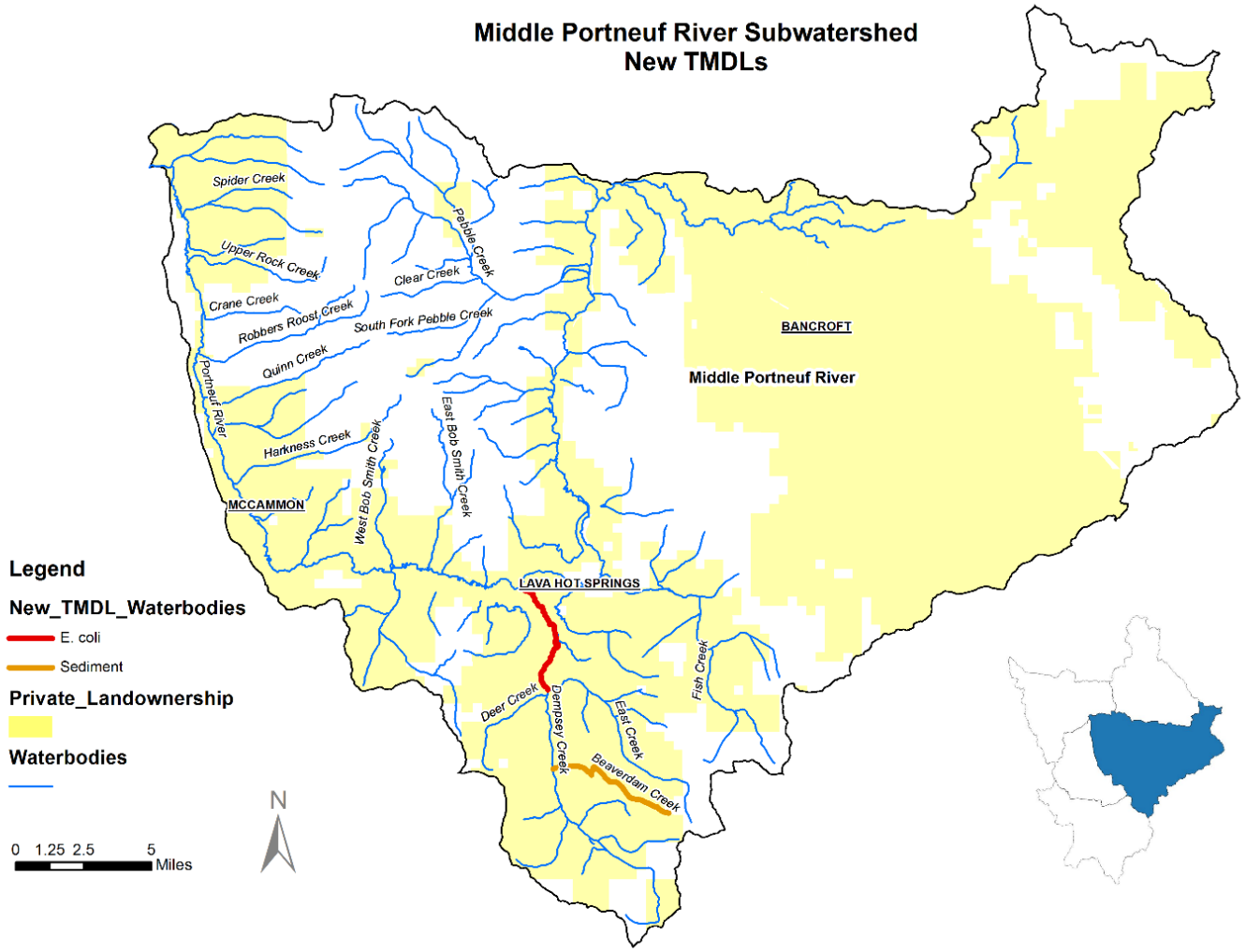
(DEQ, 2010, p. xxxii)

Figure 6: Garden Creek-Marsh Creek Subwatershed added TMDLs and delisted waterbodies



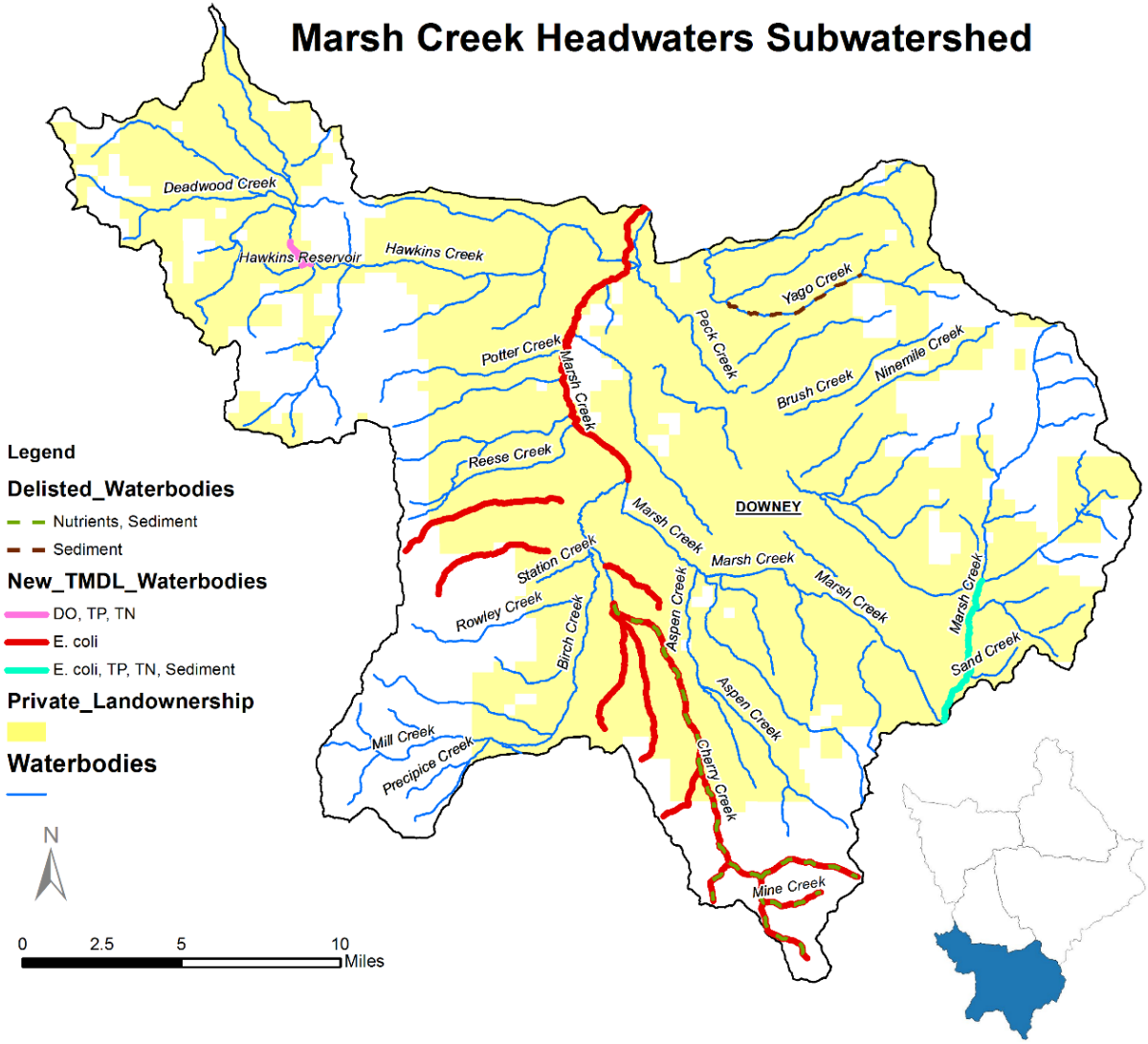
(DEQ, 2010, p. xxxii)

Figure 7: Middle Portneuf River Subwatershed added TMDLs and delisted waterbodies



(DEQ, 2010, p. xxxii)

Figure 8: Marsh Creek Headwaters Subwatershed added TMDLs and delisted waterbodies



(DEQ, 2010, p. xxxii)

Target Levels

Table 5: Portneuf River pollutant targets, target coverage, and dates that targets were endorsed by the Portneuf River Watershed Advisory Group.

Pollutant	Mainstem Target	Tributary Target	Reservoir Target
Total Suspended Solids	35 mg/L (low flow)[1] 80 mg/L (high flow)[2]	35 mg/L (low flow)[5] 80 mg/L (high flow)[2] or 80% bank stability	(4.0 mg/L)[6]
Total Phosphorus	0.07 mg/L (low flow)[3] 0.125 mg/L (high flow)[3]	0.07 mg/L (low flow)[5] 0.125 mg/L (high flow)[5]	0.03 mg/L[7]
Escherichia coli	126 organisms/100 mL[2]	126 organisms/100 mL[5]	126 organisms/ 100 mL[5]
Oil and Grease	5 mg/L[2]	5 mg/L[5]	5 mg/L
Total Nitrogen	No target[4]	1.0 mg/L as TN[5]	1.0 mg/L as TN
Dissolved Oxygen	6.0 mg/L	6.0 mg/L	6.0 mg/L[8]
Chlorophyll *a*	No target	No target	0.015 mg/L[9]

1. Endorsed by consensus at the 9/18/07 meeting.
2. This target represents no change from the 2001 TMDL and the WAG endorsed making no changes at the 9/18/07 meeting.
3. Endorsed via majority vote on 11/20/07. See appropriate meeting notes.
4. Endorsed via majority vote on 1/15/08. See appropriate meeting notes.

(DEQ, 2010, p. 95)

Sediment

Load Allocations and Necessary Reductions

Agriculture and livestock grazing along streambanks are major sources of accelerated soil erosion and sediment loading of waterbodies within the Portneuf River Subbasin. Private lands comprise 57% of the watershed. Approximately 36% of the privately-owned lands are cultivated for crop production, 1.2% utilized for pasture, and large portions of Shrub/Scrub (1.4%), Grasslands (10.4%), and Forested (6.3%) land cover types that are utilized for grazing livestock.

Excessive sediment loading of waterbodies can occur as a result of water and wind erosion, transport, and depositional processes. Figure 6 displays NRCS mapped soils that are categorized as Highly Erodible Land (HEL). HEL soils have the potential to be highly erodible by water and/or wind (USDA-NRCS, 2008). Significant portions of the Lower Portneuf River, Garden Creek-Marsh Creek, Middle Portneuf River, and Marsh Creek Headwaters subwatersheds and all of the privately-owned lands adjacent to waterbodies that are addressed in the Portneuf River TMDL Revision and Addendum are within the Bannock County Area Soil Survey boundaries; therefore, no other soil surveys or HEL lists were consulted for this implementation plan. Of the 477,332 acres of privately owned land that are within both the Portneuf River Subbasin and the Bannock County Area Soil Survey boundaries; approximately 241,350 acres (50.5%) are potentially highly erodible by water and 10,583 acres (2.2%) by wind. Monitoring records from the DEQ (shown on Table 6) on the Portneuf River, upstream of the Marsh Creek confluence, show all of the monthly averages from 2004-2006 where TSS nonpoint loads exceeded nonpoint load allocations during high flow months (March - June), except for the Portneuf River above Marsh Creek monitoring site during the month of October. Portneuf River TSS monitoring downstream of Marsh

Creek shows TSS load allocations are exceeded during high flow months along with multiple exceedances throughout the low flow months (July-Feb.), to a lesser extent. Lower Marsh Creek showed large nonpoint loads that exceeded allocations from December through May.

A significant portion of sediment loading on the Portneuf River Mainstem originates from its main tributary, Marsh Creek. Land use practices and stream channel modification on the lower 30 km of the Marsh Creek Mainstem have accelerated streambank erosion, accounting for most of the sediment entering the system. (Guilinger, 2017)

Due to the distribution and abundance of HEL soils (Figure 9), and the proximity of cropland and livestock production, selection of crop and livestock practices play an important link to the amount of sediment entering the river system. Excessive water erosion including; sheet and rill, gully, streambank erosion, and irrigation induced erosion can be accelerated by cropping practices, livestock access to streams and grazing practices. Stream channel straightening and floodplain disconnection increase flow energy producing incised and less stable banks. This accelerated soil erosion may lead to a significant source of sediment transported to waterbodies, as well as to riparian/floodplain areas and can enter surface waters through excessive streambank erosion later, which is a primary source of sediment load within the Portneuf River system, particularly in and below Marsh Creek.

Treatments

Sediment from agricultural land uses can be minimized, eliminated, or mitigated through the use of BMP's. The following BMPs and NRCS practice codes (USDA-NRCS, 2016) are the most effective in reducing sediment from agricultural sources; Critical Area Planting (342), Windbreak/Shelterbelt Renovation (650), Windbreak/Shelterbelt Establishment (380), Tree/Shrub Establishment (612), Dust Control on Unpaved Roads and Surfaces (373), Alley Cropping (311), Vegetative Barrier (601), Lined Waterway or Outlet (468), Grassed Waterway (412), Stream Habitat Improvement and Management (395), Riparian Forest Buffer (391), Filter Strip (393), Constructed Wetland (656). Table 8 lists all the BMPs identified by NRCS (USDA-NRCS, 2016) and their effectiveness for reducing sediment from agricultural sources.

Table 6: Summary of Mainstem Portneuf River and Lower Marsh Creek Total Suspended Solids (TSS) Nonpoint Load Averages (2004-2006), Load Allocations, and Necessary Load Reductions from Portneuf River TMDL Revision and Addendum, (Tables 5.5, 5.6, 5.7, 5.8, 5.9, 2.20)

	Low Flow		High Flow				Low Flow					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Portneuf River at Topaz												
Average Nonpoint Load, 2004 –2006 (tons/day)	4.796	3.796	5.996	149.9	127	32.9	12.3	7	6.5	3.796	3.396	1.796
Nonpoint Load Allocationt (tons/day)	10.66	11.46	12.86	33.5	41.1	38.9	13.1	9.1	7.9	8.06	10.76	11.16
Nonpoint Load Reduction (%)	0%	0%	0%	78%	68%	0%	0%	0%	0%	0%	0%	0%
Portneuf River above Marsh Creek												
Average Nonpoint Load, 2004 – 2006 (tons/day)	4.3	4	12	346	199.3	19.3	1	1	0.5	5.5	4.7	4
Nonpoint Load Allocation (tons/day)	8.4	8.4	27.6	26.9	5.6	4.5	1.5	1.2	1.3	3.2	9.4	9.6
Nonpoint Load Reduction (%)	0%	0%	0%	92%	97%	77%	0%	0%	0%	42%	0%	0%
Portneuf River at Edson Ficher Nature Area												
Average Nonpoint Load, 2004 – 2006 (tons/day)	22.6	43.2	122.8	309.6	163.2	55.5	4.1	3.3	5.5	12.9	14.5	11.6
Nonpoint Load Allocation (tons/day)	16.2	18.0	54.9	52.2	20.2	9.2	1.5	2.0	3.6	7.0	13.0	16.5
Nonpoint Load Reduction (%)	28%	58%	55%	83%	88%	83%	64%	40%	35%	46%	10%	0%
Portneuf River at Batiste Road												
Average Nonpoint Load, 2004 – 2006 (tons/day)	20	59.3	116.9	287.5	155.2	49.3	3.7	1.6	4.9	7.8	7	12
Nonpoint Load Allocation (tons/day)	16.1	18.3	54.4	48.6	13.6	6.8	1.3	2	3.5	6.5	12.6	15.9
Nonpoint Load Reduction (%)	20%	69%	53%	83%	91%	86%	65%	0%	29%	17%	0%	0%
Portneuf River at Siphon Road												
Average Nonpoint Load, 2004 – 2006 (tons/day)	52.6	61	118.4	332.6	226.6	55.5	16	3.3	4.2	12.1	13.1	30.6
Nonpoint Load Allocation (tons/day)	38.4	40.4	109.8	106.9	72.6	60.8	22.7	23.3	25	28.6	35	38.7
Nonpoint Load Reduction (%)	27%	34%	7%	68%	68%	0%	0%	0%	0%	0%	0%	0%
Lower Marsh Creek												
Average Nonpoint Load, 2004 – 2006 (tons/day)	14	32.1	89.8	53.6	41.8	8.1	4.6	2	5.1	4.3	5.9	13.6
Nonpoint Load Allocation (tons/day)	5.6	6.5	19.2	13.9	9.7	9	3.6	3.5	4.9	6	5.7	5.9
Nonpoint Load Reduction (%)	60%	80%	79%	74%	77%	0%	22%	0%	4%	0%	3%	57%

(DEQ, 2010)

Priority Areas

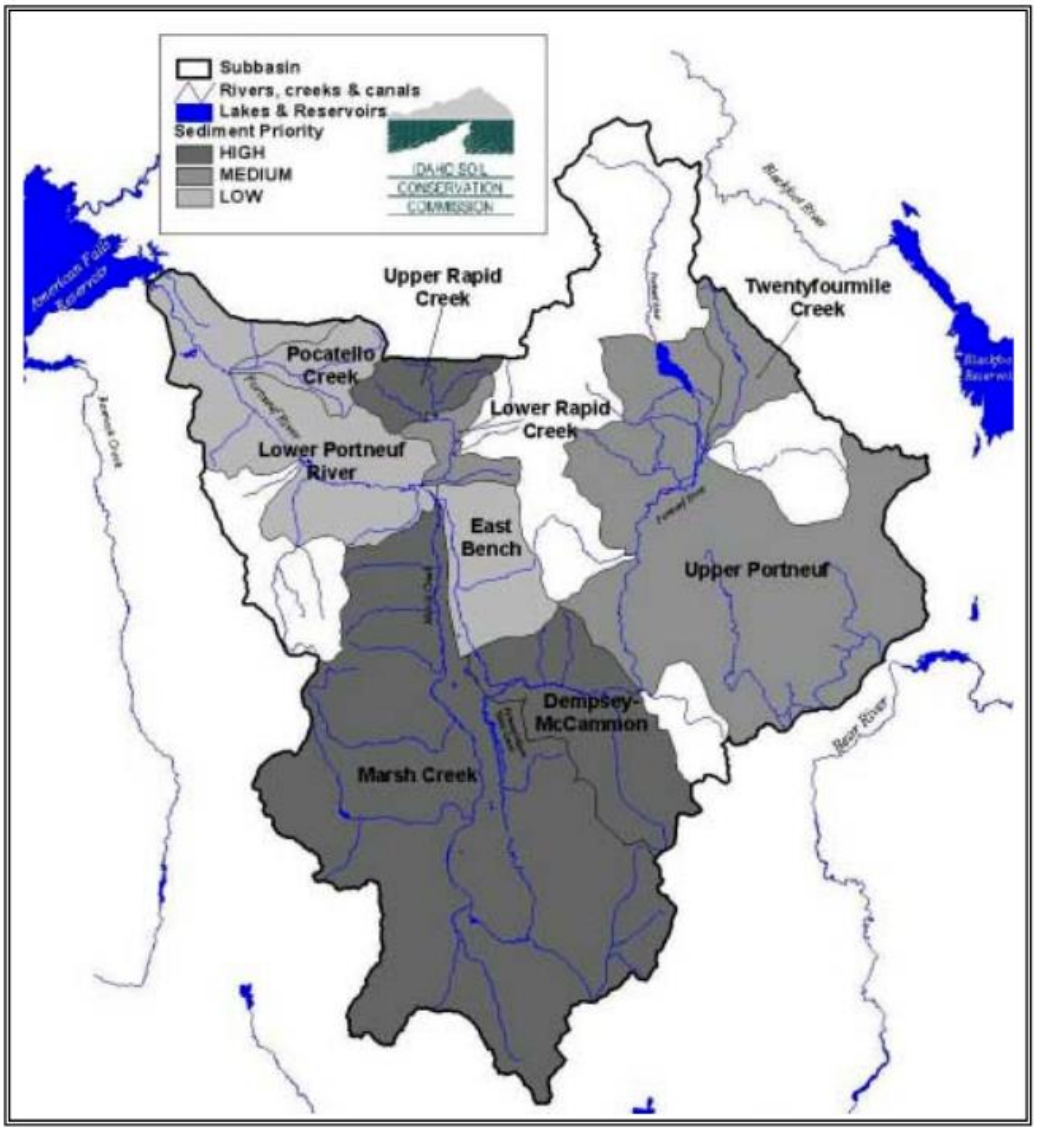
Sediment priority areas remain unchanged, see Table 7 and Figure 9. Current research should be utilized to targeted identified sediment sources within those priority areas, i.e. targeting riparian areas for BMP implementation to control/mitigate sediment along the Marsh Creek mainstem, focusing on streambank and flood plain areas, reducing streambank erosion and/or capture and storage of sediment during high flow addressing newly identified or changing sources of sediment within the river system (Guilinger, 2017).

Table 7: Sediment Priorities for Agricultural BMP Implementation

Priority Category	Watershed or Subwatershed	Priority Ranking	Segment
HIGH	Marsh Creek	1	Calvin Road to Portneuf River
	Upper Rapid Creek	2	Headwaters to Rapid Creek
	Dempsey-McCammon	3	Lava Hot Springs to McCammon
MEDIUM	Lower Rapid Creek	4	North and West forks to Portneuf River
	Twentyfourmile Creek	5	Headwaters to Portneuf River
	Upper Portneuf River	6	Chesterfield Reservoir to Lava Hot Springs
LOW	Lower Portneuf River	8	Marsh Creek to American Falls Reservoir
	East Bench	7	McCammon to Marsh Creek
	Pocatello Creek	9	Headwaters to Portneuf River

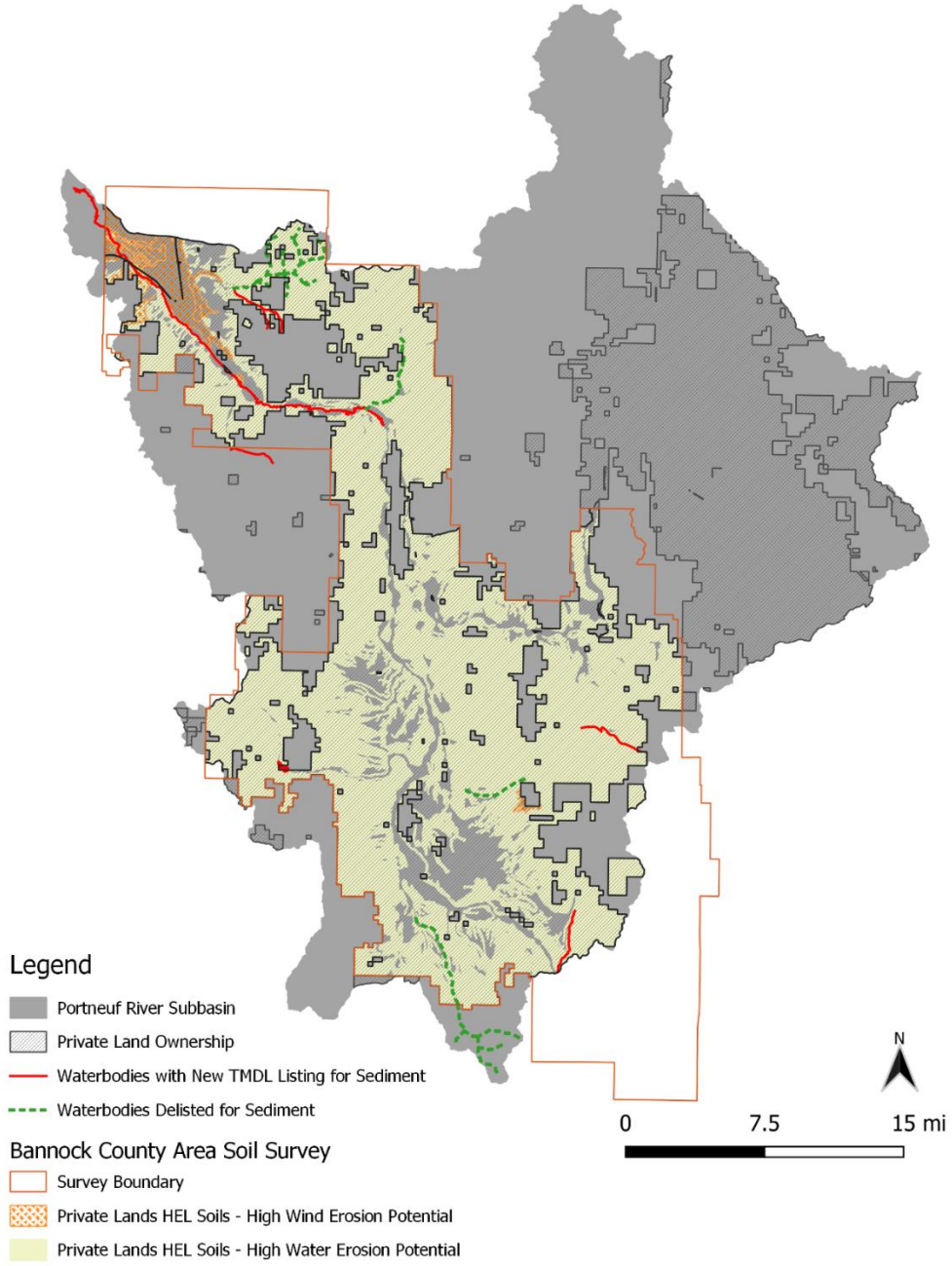
(Idaho Soil Conservation Commission, 2002, p. 40)

Figure 9: Sediment Priority Map for Agricultural BMP Implementation



(Idaho Soil Conservation Commission, 2002, p. 41)

Figure 10: Bannock County Area Soil Survey, Soils Identified as Highly Erodible Land (HEL).



(Soil Survey Staff, 2018; USDA-NRCS, 2008)

Table 8: Sediment BMPs for Agriculture and Effect on Resource Concerns

Best Management Practices (BMPs) and NRCS Practice Code	Soil Erosion - Sheet and Rill Erosion	Soil Erosion - Wind Erosion	Soil Erosion - Ephemeral Gully Erosion	Soil Erosion - Classic Gully Erosion	Soil Erosion - Streambank, Shoreline, Water Conveyance Channels	Water Quality Degradation - Excessive Sediment in Surface Water
Windbreak/Shelterbelt Renovation 650	1	5	2	0	0	1
Windbreak/Shelterbelt Establishment 380	1	5	2	0	0	1
Wetland Wildlife Habitat Management 644	0	0	0	0	0	3
Wetland Restoration 657	0	0	0	0	0	2
Wetland Enhancement 659	0	0	0	0	0	2
Wetland Creation 658	0	0	0	0	0	2
Watering Facility 614	0	2	0	1	4	2
Water Well 642	0	2	0	0	0	0
Water and Sediment Control Basin 638	0	0	4	2	0	4
Vertical Drain 630	0	0	0	1	0	1
Vegetative Barrier 601	4	1	5	2	0	2
Vegetated Treatment Area 635	0	4	0	0	0	2
Upland Wildlife Habitat Management 645	3	3	3	1	1	2
Underground Outlet 620	0	0	3	2	-1	0
Tree/Shrub Pruning 660	1	0	0	0	0	0
Tree/Shrub Establishment 612	3	5	4	1	2	3
Terrace 600	3	1	4	2	1	2
Surface Roughening 609	1	3	0	0	0	1
Surface Drainage, Main or Lateral 608	0	-1	2	-1	0	-2
Subsurface Drain 606	1	-1	4	1	1	2
Structure for Water Control 587	0	0	0	0	0	1
Stripcropping 585	4	4	4	0	0	2
Streambank and Shoreline Protection 580	0	0	0	0	4	2
Stream Habitat Improvement and Management 395	0	0	0	0	5	2
Stream Crossing 578	0	0	0	0	2	2
Spring Development 574	0	0	0	1	1	1
Spoil Spreading 572	0	0	0	0	0	2
Shallow Water Development and Management 646	0	0	0	0	0	2
Sediment Basin 350	0	0	2	2	0	4
Row Arrangement 557	3	1	3	0	0	2
Rock Barrier 555	1	0	3	0	0	2
Riparian Herbaceous Cover 390	2	2	1	0	4	4
Riparian Forest Buffer 391	0	2	1	1	4	5
Restoration and Management of Declining Habitats 643	2	2	2	0	0	2
Residue and Tillage Management, No-Till/Strip Till/Direct Seed 329	4	4	4	0	0	4
Prescribed Grazing 528	4	4	3	1	3	2
Prescribed Burning 338	2	2	1	1	0	1
Precision Land Forming 462	0	0	2	4	0	1
Pond 378	0	0	0	2	1	2
Pasture and Hay Planting 512	4	1	4	0	0	1
Open Channel 582	0	0	0	0	2	0
Multi-Story Cropping 379	1	1	1	1	0	1
Mulching 484	4	4	1	0	2	2
Mole Drain 482	1	0	1	0	-1	1
Lined Waterway or Outlet 468	0	0	5	2	0	2

Table 8; continued

Best Management Practices (BMPs) and NRCS Practice Code	Soil Erosion - Sheet and Rill Erosion	Soil Erosion - Wind Erosion	Soil Erosion - Ephemeral Gully Erosion	Soil Erosion - Classic Gully Erosion	Soil Erosion - Streambank, Shoreline, Water Conveyance Channels	Water Quality Degradation - Excessive Sediment in Surface Water
Land Smoothing 466	0	0	1	0	0	1
Irrigation Water Management 449	0	2	0	0	0	2
Irrigation System, Surface and Subsurface 443	0	1	0	-1	-1	0
Irrigation System, Sprinkler 442	0	2	0	0	0	1
Irrigation System, Microirrigation 441	0	0	0	0	0	1
Irrigation Storage Reservoir 436	0	0	0	2	0	2
Irrigation Pipeline 430	0	0	0	0	0	1
Irrigation Land Leveling 464	1	0	1	0	0	1
Irrigation Ditch Lining 428	0	0	0	0	0	1
Integrated Pest Management (IPM) 595	1	3	0	0	0	0
Hillside Ditch 423	2	0	1	2	1	2
Herbaceous Wind Barriers 603	0	4	0	0	0	1
Hedgerow Planting 422	0	1	0	0	0	0
Heavy Use Area Protection 561	2	2	2	0	2	2

Effects Quantification: Substantial Improvement = 5, Mod to Substantial Improvement = 4, Moderate Improvement = 3, Slight to Mod Improvement = 2, Slight Improvement = 1, Not Applicable / Neutral = 0, Slight Worsening = -1, Slight to Mod Worsening = 2, Moderate Worsening = -3, Mod to Substantial Worsening = -4, Substantial Worsening = -5

(USDA-NRCS, 2016)

Nutrients (Phosphorus and Nitrogen)

Load Allocations and Necessary Reductions

In aquatic systems, Phosphorus (P) is typically found mostly in organic forms or bound to soil particles (>90%) and the remainder occurring mostly in a soluble orthophosphate form. Phosphorus can be a limiting nutrient in aquatic systems and excess amounts may lead to rapid algae growth. Particulate bound P is a large source of added P to aquatic systems; therefore, sediment can be a main source of P to rooted plants and the water column. (DEQ, 2010). Additional information about sources, types, and effects of P in aquatic systems can be found within the Portneuf River TMDL Revision and Addendum.

Three added Total Phosphorus TMDLs were listed in the Addendum; Portneuf Mainstem, Marsh Creek, and Hawkins Reservoir. Tables 6 and 9 show the close correlation and timing of TSS and TP within the watershed. Within the High flow months on the Portneuf River (Mar-Jun), where average loads exceeded load allocations for Sediment they also exceeded for TP, except for June at the Portneuf River-Siphon Road location. Phosphorus loading followed the same general trends as sediment loading, apart from the lower Portneuf River (Siphon Rd.) where P-contamination water from Superfund sites influence load levels (DEQ, 2010). Sediment-bound phosphorus would be greatly reduced by implementing BMPs that are effective at controlling erosion and reducing the sediment load entering these waterbodies. Non-point load reductions needed to meet load allocations are located in Table 9-10.

Along with Phosphorus, Nitrogen (N) can be a limiting nutrient in aquatic ecosystems and an excessive amount may lead to rapid algae growth. Excessive N typically enters surface waters through surface

runoff and subsurface flow. Because nitrogen is largely water-soluble and does not bind to sediment, it is potentially susceptible to leaching to groundwater and/or movement to aquatic ecosystems.

TN TMDLs were added for Marsh Creek and Hawkins Reservoir in 2010. TN Loads, targets, and reductions needed are listed on Tables 10 and 11.

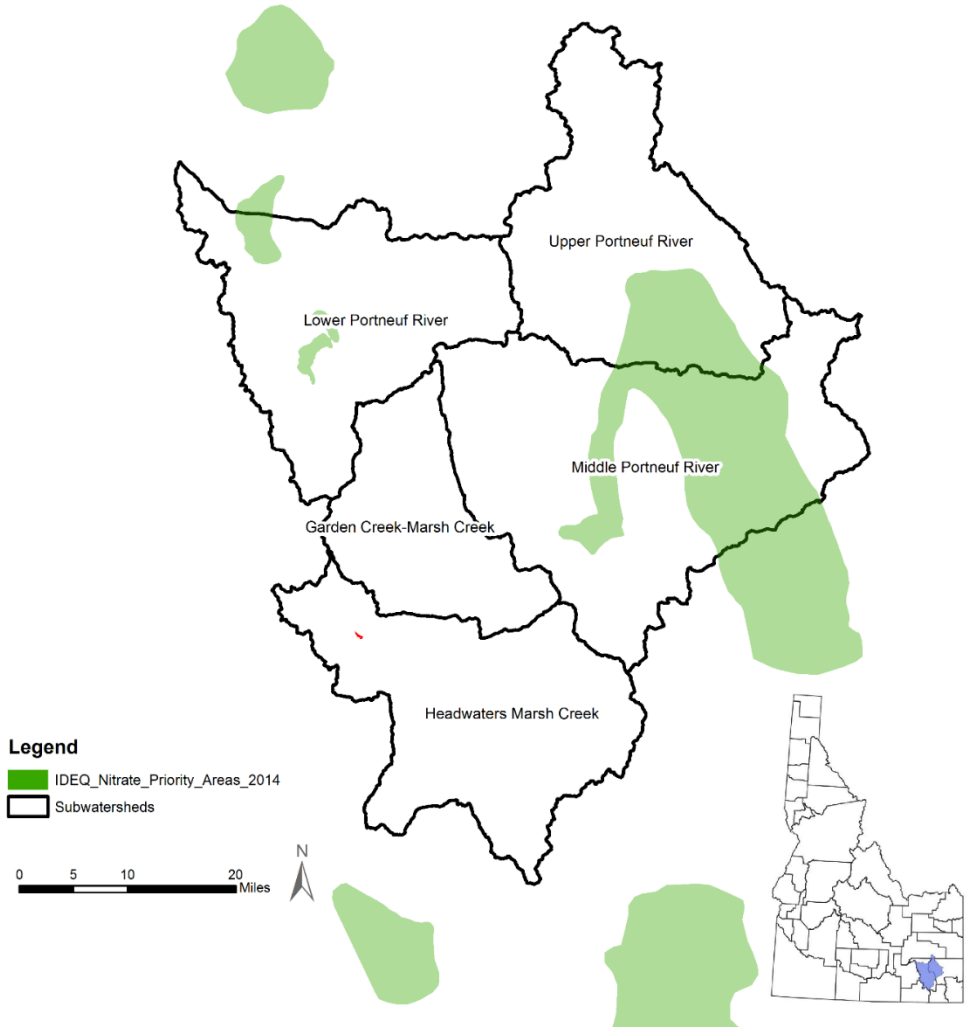
Treatments

sediment-bound phosphorus is mainly controlled by reducing the amounts of sediment from entering the aquatic systems, therefore BMPs listed to reduce excessive amounts of sediment would also reduce TP, to the corresponding effect.

A majority of the excess nitrogen (N) that contaminates the water within the watershed are from agricultural sources. "IDEQ estimates that 93% of nitrate loads originated from cattle manure, fertilizer and legume crops combined" (ISCC, 2002, p. 58). Along with Marsh Creek and Hawkins Reservoir TMDLs added it the 2002 Addendum, Nitrate priority areas have been updated to reflect monitoring updates (see, figure 10).

According to NRCS (USDA-NRCS, 2016), the most effective BMPs for reducing nutrient loads in surface waters include; Sediment Basin (350), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Nutrient Management (590), Filter Strip (393), and Agrichemical Handling Facility (309). The most effective BMPs for reducing nutrient loads in groundwater include; Well Decommissioning (351), Riparian Herbaceous Cover (390), Riparian Forest Buffer (391), Nutrient Management (590), and Agrichemical Handling Facility (309). Other Agricultural BMPs identified as addressing nutrient resource concerns in surface and ground water and their effectiveness are listed in Table 8.

Figure 11: 2014 IDEQ Nitrate Priority Areas



(IDEQ, 2016)

Table 9: Nutrient (Phosphorus and Nitrogen) BMPs for Agriculture and Effect on Resource Concerns

Best Management Practices (BMPs) and NRCS Practice Code	Water Quality Degradation - Nutrients in Surface water	Water Quality Degradation - Nutrients in Groundwater
Windbreak/Shelterbelt Renovation 650	1	1
Windbreak/Shelterbelt Establishment 380	1	1
Wetland Restoration 657	3	1
Wetland Enhancement 659	3	1
Wetland Creation 658	3	1
Well Decommissioning 351	0	5
Waterspreading 640	2	-1
Vertical Drain 630	1	-2
Vegetative Barrier 601	2	0
Vegetated Treatment Area 635	4	-2
Tree/Shrub Pruning 660	1	1
Tree/Shrub Establishment 612	1	1
Terrace 600	2	-2
Surface Drainage, Main or Lateral 608	-2	1
Surface Drainage, Field Ditch 607	-2	1
Subsurface Drain 606	-2	1
Stripcropping 585	2	0
Streambank and Shoreline Protection 580	1	0
Shallow Water Development and Management 646	1	1
Sediment Basin 350	5	-1
Row Arrangement 557	-2	2
Riparian Herbaceous Cover 390	5	5
Riparian Forest Buffer 391	5	5
Residue and Tillage Management, No-Till/Strip Till/Direct Seed 329	2	-1
Prescribed Grazing 528	1	1
Prescribed Burning 338	2	1
Precision Land Forming 462	1	2
Pond Sealing or Lining, Soil Dispersant 521B	2	2
Pond Sealing or Lining, Flexible Membrane 521A	2	2
Pond Sealing or Lining, Compacted Clay Treatment 521D	2	2
Pond Sealing or Lining, Bentonite Sealant 521C	2	2
Pond 378	2	-1
Pasture and Hay Planting 512	1	0
Nutrient Management 590	5	5
Multi-Story Cropping 379	1	0
Mulching 484	2	-1
Mole Drain 482	-4	2
Lined Waterway or Outlet 468	0	2
Land Smoothing 466	1	2
Irrigation Water Management 449	2	2
Irrigation System, Tailwater Recovery 447	2	-1
Irrigation System, Surface and Subsurface 443	1	1
Irrigation System, Sprinkler 442	2	1
Irrigation System, Microirrigation 441	2	2
Irrigation Pipeline 430	1	0
Irrigation Land Leveling 464	2	2
Irrigation Ditch Lining 428	1	1
Herbaceous Wind Barriers 603	1	0
Hedgerow Planting 422	2	0
Heavy Use Area Protection 561	1	0
Grassed Waterway 412	2	0
Forage Harvest Management 511	1	0
Filter Strip 393	5	2
Field Border 386	2	2
Drainage Water Management 554	1	-1

Table 9, continued

Best Management Practices (BMPs) and NRCS Practice Code	Water Quality Degradation - Nutrients in Surface water	Water Quality Degradation - Nutrients in Groundwater
Deep Tillage 324	1	-2
Cross Wind Trap Strips 589C	2	0
Cross Wind Ridges 588	1	0
Critical Area Planting 342	2	1
Cover Crop 340	2	2
Contour Orchard and Other Fruit Area 331	2	-1
Contour Farming 330	2	-1
Contour Buffer Strips 332	2	-1
Constructed Wetland 656	4	1
Conservation Crop Rotation 328	2	2
Conservation Cover 327	4	4
Closure of Waste Impoundment 360	2	2
Bedding 310	-2	1
Anionic Polyacrylamide (PAM) Erosion Control 450	2	-1
Amendments for the Treatment of Agricultural Waste 591	2	2
Alley Cropping 311	3	1
Agrichemical Handling Facility 309	5	5
Access Control 472	1	1

Effects Quantification: Substantial Improvement = 5, Mod to Substantial Improvement = 4, Moderate Improvement = 3, Slight to Mod Improvement = 2, Slight Improvement = 1, Not Applicable / Neutral = 0, Slight Worsening = -1, Slight to Mod Worsening = 2, Moderate Worsening = -3, Mod to Substantial Worsening = -4, Substantial Worsening = -5

(USDA-NRCS, 2016)

Priority Areas

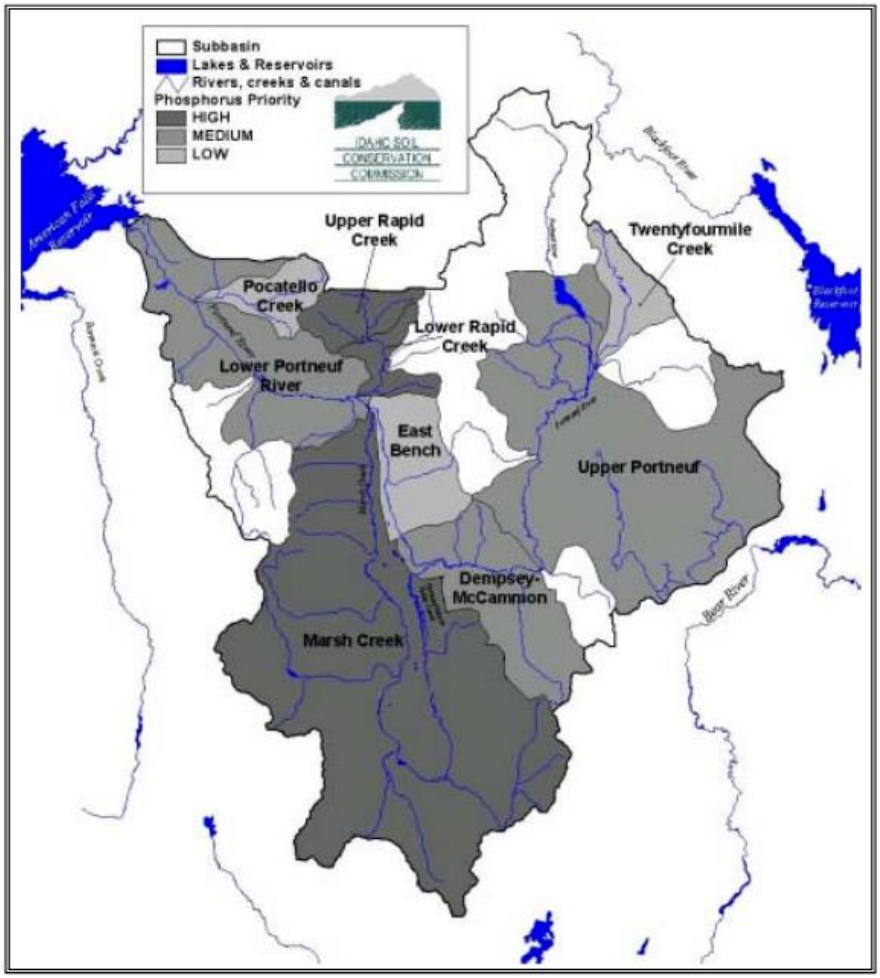
Phoshorus and Nitrogen priority areas remain unchanged, see Table 10-11 and Figure 12-13.

Table 10: Phosphorus Priorities for Agricultural BMP Implementation

Priority Category	Watershed or Subwatershed	Priority Ranking	Segment
HIGH	Lower Rapid Creek	1	North and West forks to Portneuf River
	Upper Rapid Creek	2	Headwaters to Rapid Creek
	Marsh Creek	3	Calvin Road to Portneuf River
MEDIUM	Upper Portneuf River	4	Chesterfield Reservoir to Lava Hot Springs
	Lower Portneuf River	5	Marsh Creek to American Falls Reservoir
	Dempsey-McCammon	6	Lava Hot Springs to McCammon
LOW	Twentyfourmile Creek	7	Headwaters to Portneuf River
	Pocatello Creek	8	Headwaters to Portneuf River
	East Bench	9	McCammon to Marsh Creek

(Idaho Soil Conservation Commission, 2002, p. 53)

Figure 12: Phosphorus Priority Map for Agricultural BMP Implementation



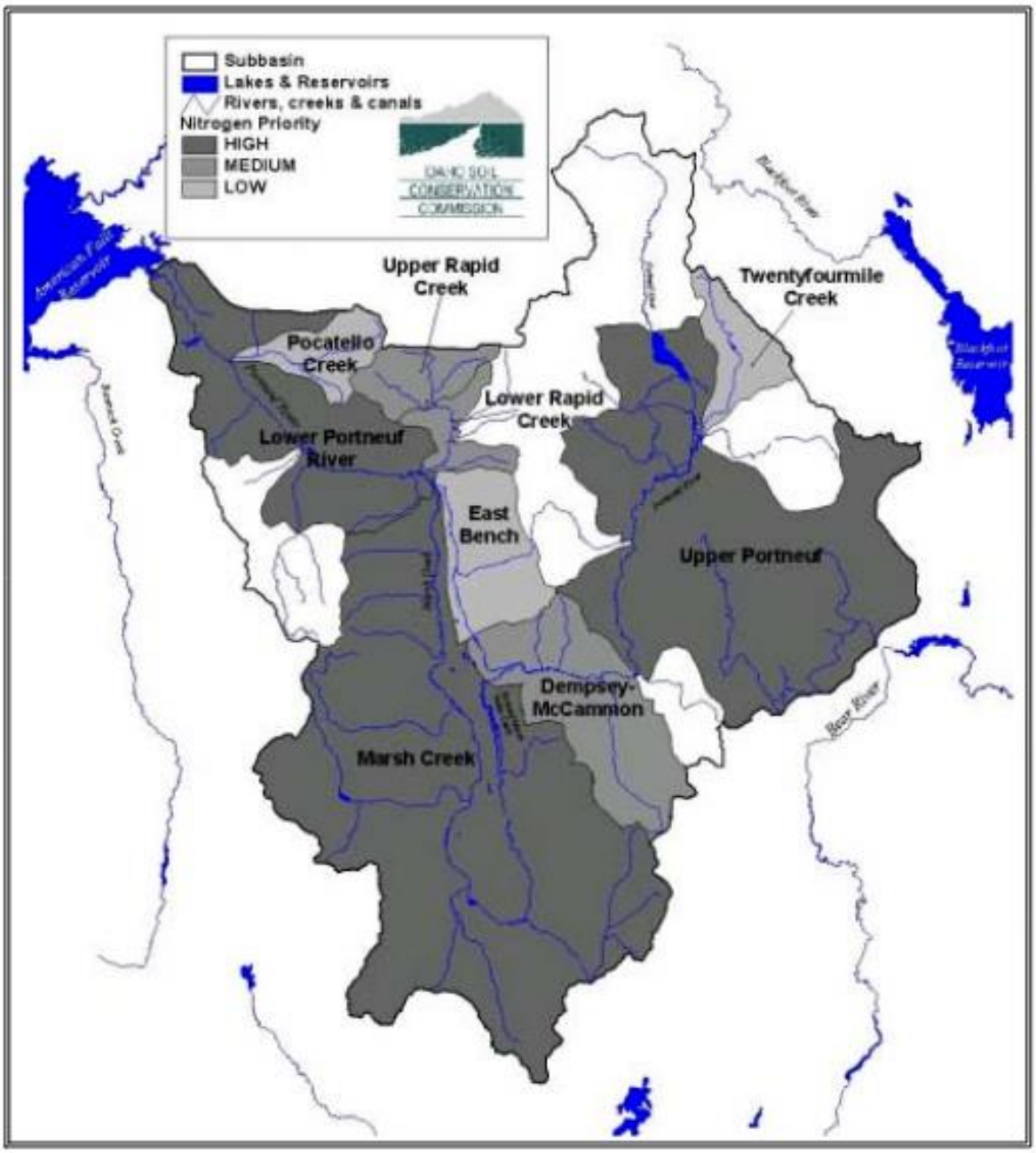
(Idaho Soil Conservation Commission, 2002, p. 54)

Table 11: Nitrogen Priorities for Agricultural BMP Implementation

Priority Category	Watershed or Subwatershed	Priority Ranking	Segment
HIGH	Upper Portneuf River	1	Chesterfield Reservoir to Lava Hot Springs
	Lower Portneuf River	2	Marsh Creek to American Falls Reservoir
	Marsh Creek	3	Calvin Road to Portneuf River
MEDIUM	Lower Rapid Creek	4	North and West forks to Portneuf River
	Upper Rapid Creek	5	Headwaters to Rapid Creek
	Dempsey-McCammon	6	Lava Hot Springs to McCammon
LOW	Twentyfourmile Creek	7	Headwaters to Portneuf River
	Pocatello Creek	8	Headwaters to Portneuf River
	East Bench	9	McCammon to Marsh Creek

(Idaho Soil Conservation Commission, 2002, p. 58)

Figure 13: Nitrogen Priority Map for Agricultural BMP Implementation



(Idaho Soil Conservation Commission, 2002, p. 59)

Table 12: Summary of Mainstem Portneuf River Total Phosphorus (TP) Nonpoint Load Averages (2004-2006), Load Allocations, and Necessary Load Reductions from Portneuf River TMDL Revision and Addendum, (Tables 5.10, 5.11, 5.12, 5.13, 5.14, 5.24)

	Low Flow		High Flow				Low Flow					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Portneuf River at Topaz												
Average Nonpoint Load, 2004 –2006 (lbs/day)	30.8	26.7	49.4	378.8	350.8	103.8	60.9	47.2	19.8	17	19	25.4
Nonpoint Load Allocation (lbs/day)	41.8	44.6	50.3	104.6	128.4	121.7	52.2	36.2	31.8	31.1	41.9	43.7
Nonpoint Load Reduction (%)	0%	0%	0%	72%	63%	0%	14%	23%	0%	0%	0%	0%
Portneuf River above Marsh Creek												
Average Nonpoint Load, 2004 –2006 (lbs/day)	30.2	18.2	49.7	380.1	757.7	59.2	4.5	4.6	2.3	18.4	17.0	24.9
Nonpoint Load Allocation (lbs/day)	33.5	33.6	86.2	84.0	17.6	14.1	5.9	4.6	5.0	13.0	37.5	38.6
Nonpoint Load Reduction (%)	0%	0%	0%	78%	98%	76%	0%	0%	0%	29%	0%	0%
Portneuf River at Edson Ficher Nature Area												
Average Nonpoint Load, 2004 –2006 (lbs/day)	92.57	291.54	447.73	906.13	466.64	157.35	16.59	10.19	18.68	44.02	49.93	70.45
Nonpoint Load Allocation (lbs/day)	63.99	71.19	170.89	162.39	62.39	28.09	5.29	7.39	13.79	27.29	51.29	65.09
Nonpoint Load Reduction (%)	31%	76%	62%	82%	87%	82%	68%	27%	26%	38%	0%	8%
Portneuf River at Batiste Road												
Average Nonpoint Load, 2004 –2006 (lbs/day)	94.9	51.4	458.6	678.1	564.5	146.7	25.3	16.1	20.5	53.4	49.2	81.0
Nonpoint Load Allocation (lbs/day)	64.6	72.8	170.2	152.0	42.5	21.1	5.1	7.9	13.9	26.2	50.6	63.8
Nonpoint Load Reduction (%)	32%	0%	63%	78%	92%	86%	80%	51%	32%	51%	0%	21%
Portneuf River at Siphon Road												
Nonpoint Load (lbs/day)	94.9	51.4	458.6	678.1	564.5	146.7	25.3	16.1	20.5	53.4	49.2	81.0
Nonpoint Load Allocation	74.5	82.2	262.1	252.9	145.8	109.0	11.7	13.9	20.8	35.3	60.9	75.8
Nonpoint Load Reduction (%)	21%	0%	43%	63%	74%	26%	54%	14%	0%	34%	0%	6%
Lower Marsh Creek												
Nonpoint Load (lbs/day)	59	49	388.2	124	114.2	32.1	21	13	20.7	28.1	29.8	56.5
Nonpoint Load Allocation (lbs/day)	22.6	25.9	60	43.4	30.4	28.1	14.5	14	19.6	24	22.7	23.6
Nonpoint Load Reduction (%)	62%	47%	85%	65%	73%	12%	31%	0%	5%	14%	24%	58%

(DEQ, 2010)

Table 13: TN and TP loading from Hawkins Creek to Hawkins Reservoir (DEQ, 2010, pp. 147, Table 5.25)

Date and Discharge (cfs)	TN Conc. (mg/L)	TN Load (lbs/day)	TN Target Load (lbs/day)	TP Conc. (mg/L)	TP Load (lbs/day)	TP Target Load (lbs/day)
21 June 2006 6.9	1.02	38.0	37.3	0.346	12.9	4.7
27 July 2006 2.7	1.32	19.2	14.6	0.446	6.5	1.0
31 August 2006 2.2	1.62	19.2	11.9	0.169	2.0	0.8
27 September 2006 <0.1	0.66	0.4	0.5	0.273	0.1	0.1
23 January 2007 <0.1	0.42	0.2	0.5	0.222	0.1	0.04
9 April 2007 0.2	0.51	0.6	1.1	0.221	0.2	0.1
18 July 2007 4.8	0.85	22.0	25.9	0.320	8.3	1.8
3 March 2008 0.5 (estimated)	0.4	1.1	2.7	0.267	0.7	0.2
Loads are estimated using a target of 1.0 mg/L TN concentration and a TP target of 0.07 mg/L low-flow and 0.125 mg/L high-flow (April, May, and June) for Hawkins Creek above Hawkins Reservoir.						

(DEQ, 2010, p. 147)

Table 14: Average TN load in lbs./day (2004-2006), Target Load and Load Reductions using 10th percentile Q at Lower Marsh Creek Gage (DEQ, 2010, pp. 145, Table 5.23)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average TN load (2004-2006)	1586a	865.3b	1680	1222	936.8	529.1	329.9	259.9	387.6	606.1	643.9	732.8
Target Load	322.8	369.7	479.7	347.0	242.9	224.5	207.3	200.5	279.5	342.9	324.4	337.3
Load Reduction Required	80%	57%	71%	72%	74%	58%	37%	0%	28%	43%	50%	54%

Target loads are based on a 1.0 mg/L low-flow TN target.

a. Note that the 3-year average is based only on 2006 loads due to no total Kjeldahl N sampling in other years.

b. Note that the 3-year average is based on 2005 and 2006 loads only due to no total Kjeldahl N sampling in other years.

Bacteria

Load Allocations and Necessary Reductions

Bacteria is one of the largest increased pollutant of concern for a majority of the waterbodies listed in the Portneuf River TMDL Revision and Addendum, mainly attributed to *Escherichia coli (E. coli).* Excluding Marsh Creek, there was an increase from 12 to 22 §303(d) listed tributaries and one reservoir within the subbasin from 2002 to 2008. (DEQ, 2010, p. 132). Table 10 from the Portneuf River TMDL Revision and Addendum shows the organism sampling, E. coli loads, and target loads.

Table 15: Portneuf River Subbasin Tributary assessment units listed for *E. coli,* (DEQ, 2010, pp. 133, Table 5.18)

Listed Water Body Name	Assessment Unit and Date Sampled	5-sample geomean (organisms /100mL)	*E. coli* Load (organisms /day x 10^9)	Target Load (organisms/ day x 10^9)
Cherry Creek	ID17040208SK014_02a (upper Cherry Creek – Headwaters to USFS boundary); 2007	2,183	481.7	27.6
Dempsey Creek	ID17040208SK017_03 (lower Dempsey Creek – East Creek to Portneuf River); 2005	1,005	346.7	43.1
Garden Creek	ID17040208SK010_02b (lower Garden Creek –Garden Creek Gap to Marsh); 2002	558	159.7	35.8
Indian Creek	ID17040208SK005_02 (source to mouth); 2007	984	94.1	12.0
Mink Creek	ID17040208SK004_04 (USFS boundary to Portneuf River); 2007	381	146.3	48.0
Marsh Creek	ID17040208SK006_03a (confluence of Rt and Lt Forks to Red Rock Pass); 2007 and 2008	195*	160.3	102.8
Marsh Creek	ID17040208SK006_04a (Birch Creek to Cottonwood Creek); 2003 to 2005	219*	180.0	102.8
Marsh Creek	ID17040208SK006_04 (Cottonwood Creek to Portneuf River); 2007 and 2008	78**	64.1	102.8

*Marsh Creek AU ID17040208SK006_03a and ID17040208SK006_04a *E. coli* concentrations were estimated using data from IASCD July 2007 to July 2008 for _03a and December 2006 to July 2008 for _04a from bimonthly sampling activities.

** Lower Marsh Creek (ID17040208SK006_04) *E. coli* concentrations were estimated using the median monthly sampling results from concentration from July 2003 to December 2005. Therefore, the *E. coli* concentrations used for Marsh Creek assessment units do not represent a 5-sample geomean, but rather the median concentration of *E. coli* over the period of record for each of the monitoring locations. Additionally, Marsh Creek *E. coli* loads were calculated using the 10th percentile discharge (33.6 cfs) from lowest discharge month (August) from the USGS Marsh Creek gaging station for the period of record extending from 1955 to 2006.

Treatments

Bacteria (E. coli) from agricultural sources can be reduced or eliminated by implementing effective BMPs and managing animal production (i.e. grazing management, AFO/CAFOs, exclusionary fencing, watering facilities, etc.). Due to the increase in waterbodies listed for Bacteria impairments, grazing management may need to be adjusted in timing to reduce runoff of waste to waterbodies, i.e. graze certain ephemeral areas during the dry season when there is less potential for bacterial runoff to waterbodies. Agricultural BMPs identified as addressing bacteria resource concerns and their effectiveness are listed in Table 16

Table 16: Bacteria BMPs for Agriculture and Effect on Resource Concerns

Best Management Practices (BMPs) and NRCS Practice Code	Water Quality Degradation - Excess Pathogens and Chemicals from Manure, Bio-solids or Compost Applications in Surface Water	Water Quality Degradation - Excess Pathogens and Chemicals from Manure, Bio-solids or Compost Applications in Groundwater
Wetland Wildlife Habitat Management 644	1	0
Wetland Restoration 657	1	0
Wetland Enhancement 659	1	0
Wetland Creation 658	1	0
Well Decommissioning 351	0	2
Watering Facility 614	1	-1
Vertical Drain 630	1	-1
Vegetative Barrier 601	1	0
Vegetated Treatment Area 635	5	0
Tree/Shrub Establishment 612	1	1
Terrace 600	2	-1
Surface Drainage, Main or Lateral 608	-2	2
Surface Drainage, Field Ditch 607	-2	1
Subsurface Drain 606	0	1
Stripcropping 585	1	0
Streambank and Shoreline Protection 580	1	0
Spring Development 574	1	0
Shallow Water Development and Management 646	2	-1
Sediment Basin 350	2	-1
Row Arrangement 557	1	0
Rock Barrier 555	1	0
Riparian Herbaceous Cover 390	3	2
Riparian Forest Buffer 391	3	1
Residue and Tillage Management, No-Till/Strip Till/Direct Seed 329	1	0
Prescribed Grazing 528	1	1
Precision Land Forming 462	0	1
Pond Sealing or Lining, Soil Dispersant 521B	0	2
Pond Sealing or Lining, Flexible Membrane 521A	0	2
Pond Sealing or Lining, Compacted Clay Treatment 521D	0	2
Pond Sealing or Lining, Bentonite Sealant 521C	0	2
Pasture and Hay Planting 512	1	0
Nutrient Management 590	1	1
Multi-Story Cropping 379	1	1
Mole Drain 482	0	2
Land Reclamation, Landslide Treatment 453	1	0
Irrigation Water Management 449	2	2

Table 16, continued

Best Management Practices (BMPs) and NRCS Practice Code	Water Quality Degradation - Excess Pathogens and Chemicals from Manure, Bio-solids or Compost Applications in Surface Water	Water Quality Degradation - Excess Pathogens and Chemicals from Manure, Bio-solids or Compost Applications in Groundwater
Irrigation System, Surface and Subsurface 443	1	1
Irrigation System, Microirrigation 441	2	1
Irrigation Pipeline 430	1	1
Irrigation Land Leveling 464	2	2
Irrigation Ditch Lining 428	-1	1
Heavy Use Area Protection 561	2	0
Grassed Waterway 412	1	0
Forage Harvest Management 511	1	0
Filter Strip 393	3	1
Field Border 386	1	0
Drainage Water Management 554	1	1
Diversion 362	1	0
Cover Crop 340	1	2
Contour Farming 330	1	0
Contour Buffer Strips 332	1	-1
Constructed Wetland 656	4	3
Conservation Crop Rotation 328	1	0
Conservation Cover 327	1	2
Closure of Waste Impoundment 360	0	2
Bedding 310	-2	1
Animal Trails and Walkways 575	1	0
Amendments for the Treatment of Agricultural Waste 591	2	2
Alley Cropping 311	3	1
Access Control 472	1	1

Effects Quantification: Substantial Improvement = 5, Mod to Substantial Improvement = 4, Moderate Improvement = 3, Slight to Mod Improvement = 2, Slight Improvement = 1, Not Applicable / Neutral = 0, Slight Worsening = -1, Slight to Mod Worsening = 2, Moderate Worsening = -3, Mod to Substantial Worsening = -4, Substantial Worsening = -5

(USDA-NRCS, 2016)

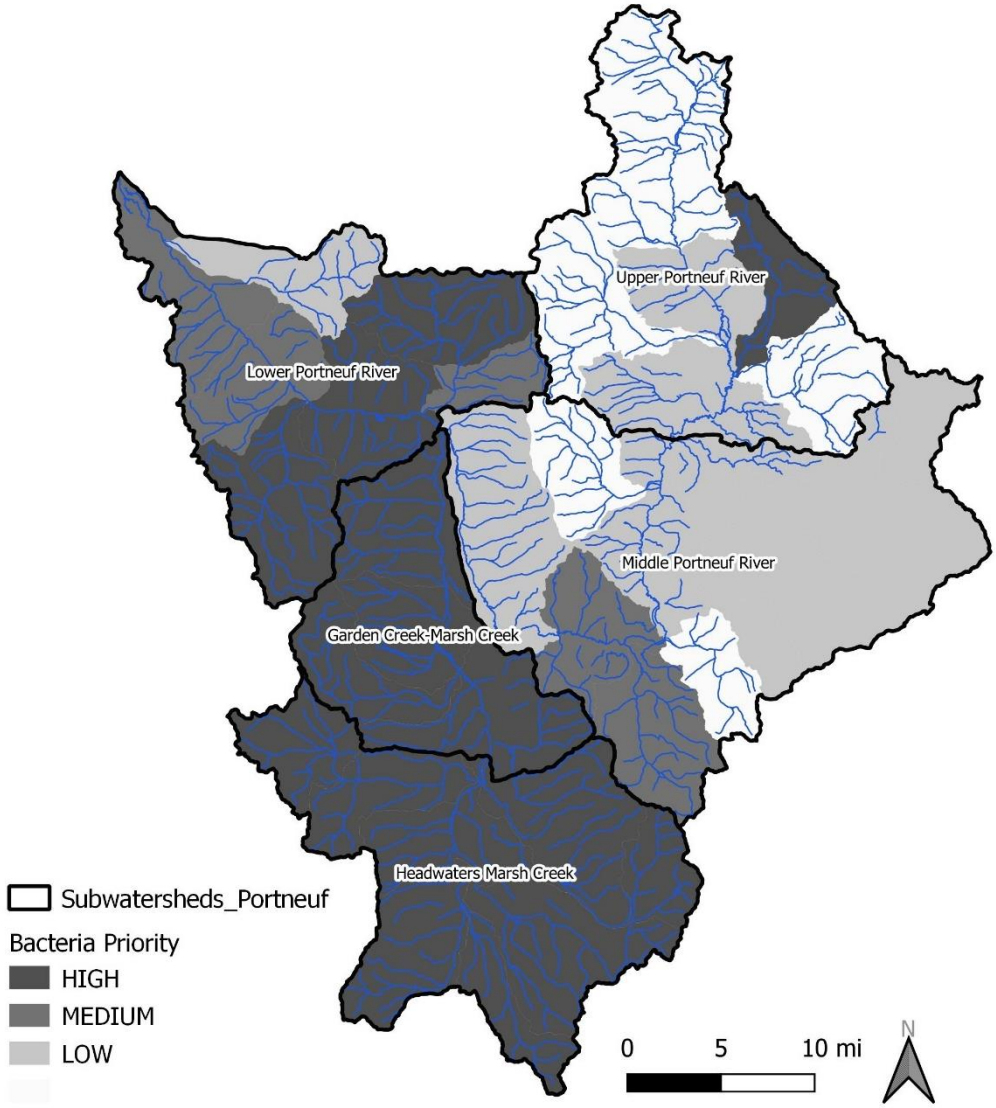
Priority Areas

Bacteria priority areas have primarily stayed unchanged, with the exception of elevating southern portions of the Lower Portneuf River Subwatershed (Indian Creek and Mink Creek areas) from a medium to a high priority, effectively merging with the previously high priority designated Marsh Creek watershed.

Table 17: Bacteria Priorities for Agricultural BMP Implementation

Priority Category	Watershed or Subwatershed	Priority Rank	Segment
HIGH	Upper Rapid Creek	1	Headwaters to Rapid Creek
	Twenty-four Mile Creek	2	Headwaters to Portneuf River
	Marsh, Indian, & Mink Creek	3	Marsh Creek - Calvin Road to Portneuf River Indian/Mink Creek– Headwaters to Portneuf River
MEDIUM	Lower Rapid Creek	4	North and West forks to Portneuf River
	Remaining Lower Portneuf River	5	Portneuf River from Mink Creek to American Falls Reservoir Lower Rapid Creek
	Dempsey – McCammon	6	Lava Hot Springs to McCammon
LOW	East Bench	7	McCammon to Marsh Creek
	Upper Portneuf	8	Chesterfield Reservoir to Lava Hot Springs
	Pocatello Creek	9	Headwaters to Portneuf River

Figure 14: Bacterial Priority Map for Agricultural BMP Implementation



Oil and Grease

Oil and grease monitoring have shown measurable concentrations in the lower Portneuf River and that the target of 5mg/L has frequently been exceeded on the lower Portneuf River following storm events While these are located in more urban areas and not from agricultural sources and therefore not addressed in this plan, more monitoring is needed to understand background concentrations and loading pattern. BMPs should be utilized to minimize oil and grease loading to the Portneuf River (DEQ, 2010, p. 129).

The following BMPs are identified by NRCS as effective at minimizing Petroleum pollutants from entering surface waters: Land Reclamation, Landslide Treatment (453), Irrigation System, Tailwater Recovery (447), Filter Strip (393), Constructed Wetland (656), Agrichemical Handling Facility (309) (USDA-NRCS, 2016).

Dissolved Oxygen

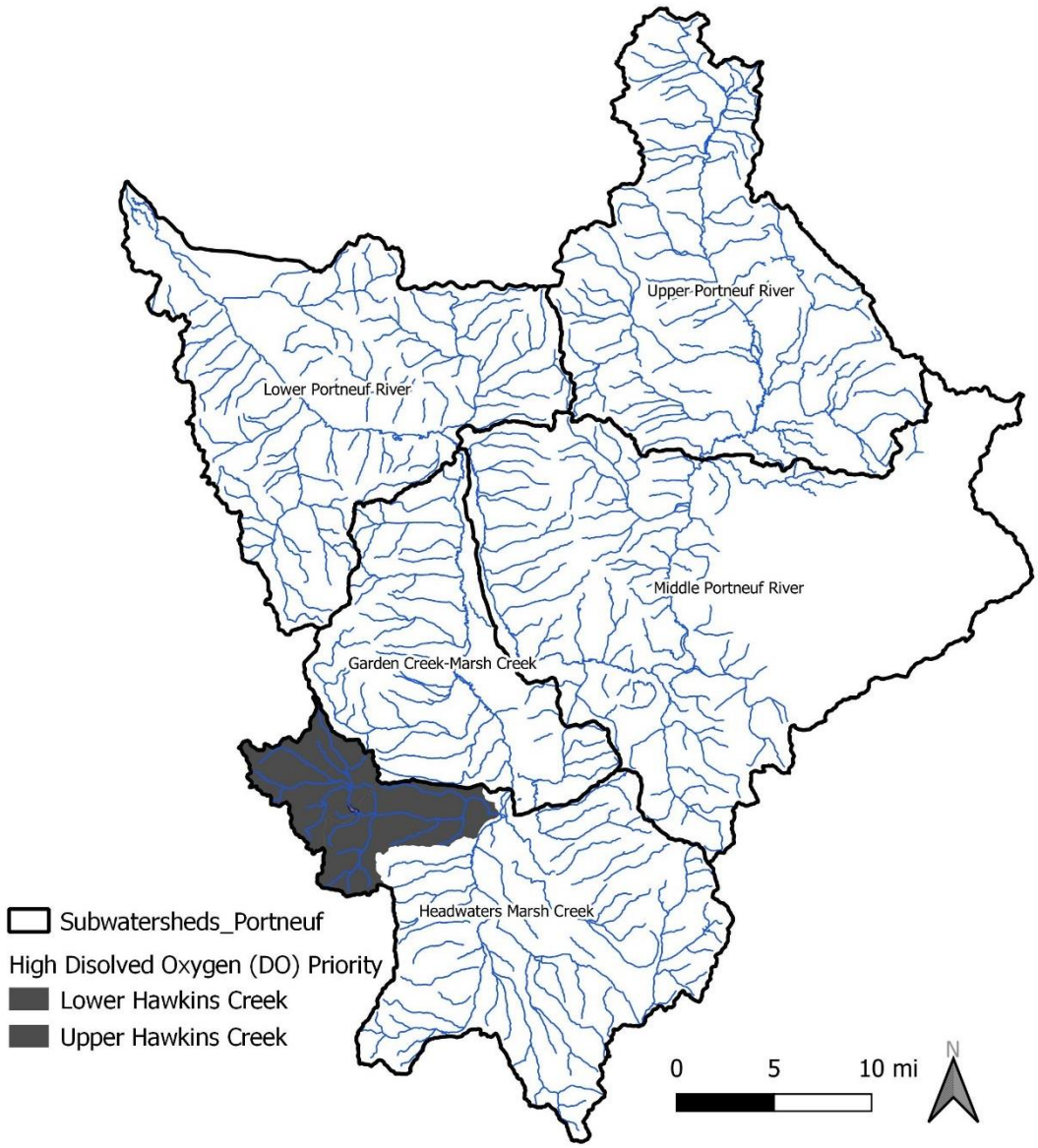
Load Allocations and Necessary Reductions

Monitoring on Hawkins Reservoir to Hawkins Creek, between 2006 and 2008, showed below target levels for N, however, P loads met or exceeded target levels. P is likely one of the limiting nutrients for algae, aquatic plants, and phytoplankton. This likely led to Hawkins Reservoir's failure to meet the dissolved oxygen (DO) criterion for cold water aquatic life during that time period (DEQ, 2010).

Priority Areas

The subwatersheds above Hawkins Reservoir are priority areas for Dissolved Oxygen, see Figure 15.

Figure 15: Dissolved Oxygen Priority Map for Agricultural BMP Implementation



Treatments

Since Phosphorus and Nitrogen are the most common limiting nutrient for algae, aquatic plants, and phytoplankton, they are the root cause of DO concerns, BMPs that address sediment and nutrient loads will improve DO conditions (DEQ, 2010).

Monitoring & Evaluation

Agricultural BMP Implementation Monitoring

Monitoring of BMP implementation will depend greatly on funding sources and requirements. Monitoring may include; grant reporting and documentation, conservation planning and construction checks, status reviews, 319 checks, annual conservation project tours, etc.

Agricultural BMP Effectiveness Monitoring

BMP Effectiveness will consist of background water quality monitoring by DEQ through the Beneficial Use Reconnaissance Program (BURP), which is used to create subbasin assessments, develop water quality standards and criteria, and populate data for the Idaho Integrated Report that shows the condition of all the state's waters (DEQ, 2019). Funding sources may include requirements such as photo monitoring, annual on-site visits, water testing, predictive modeling to show future benefits, etc. to show effectiveness. "Idaho Agricultural Best Management Practices – Field Guide for Evaluating BMP Effectiveness" produced by ISWCC may be utilized to select appropriate evaluation methods and level of documentation by land use and BMP.

Idaho State University (ISU) has and is doing research projects, monitoring water quality, and studying BMP effectiveness within the subbasin. While there is no guarantee because of priority and funding concerns, research and monitoring will likely continue in the future.

Evaluation and Modification

Effectiveness of the Implementation Plan will be evaluated during the TMDL 5-year review process where BMP implementation data and monitoring data are cumulated and reviewed. This is when a determination of any modifications to the Implementation Plan will occur to ensure water quality standards and beneficial use criteria are met.

Funding Sources

The following list identifies some funding sources available to private agricultural landowners. It is always recommended to contact the local Soil and Water Conservation District, USDA, or Idaho Soil and Water Conservation Commission offices for any updated funding opportunities for private landowners to implement agricultural BMPs to protect natural resources.

Resource Conservation and Rangeland Development Program (RCRDP) –The RCRDP is a low-interest loan program administered by the Idaho Soil and Water Conservation Commission (ISWCC) for implementation of agricultural and rangeland best management practices or loans to purchase equipment to increase conservation. These loans are a good way to get capital to start a project,

especially in conjunction with other funding sources or grants that are reimbursement based. https://swc.idaho.gov/what-we-do/conservation-loans/

CWA 319 –These are Environmental Protection Agency (EPA) funds allocated to Tribal entities and the State of Idaho. The Idaho Department of Environmental Quality (DEQ) administers the Clean Water Act §319 Non-point Source Management Program for areas outside the Tribal Reservations. Funds focus on projects to improve water quality and are usually related to the TMDL process. https://www.deq.idaho.gov/water-quality/grants-loans/nps-319-subgrants/

Environmental Quality Incentives Program (EQIP): EQIP provides financial and technical assistance to agricultural producers in order to address natural resource concerns and deliver environmental benefits such as improved water and air quality, conserved ground and surface water, reduced soil erosion and sedimentation or improved or created wildlife habitat. https://www.nrcs.usda.gov/wps/portal/nrcs/main/id/programs/financial/eqip/

Regional Conservation Partnership Program (RCPP) - RCPP promotes coordination between NRCS and its partners to deliver conservation assistance to producers and landowners. NRCS provides assistance to producers through partnership agreements and through program contracts or easement agreements. https://www.nrcs.usda.gov/wps/portal/nrcs/main/id/programs/farmbill/rcpp/

The Agricultural Conservation Easement Program (ACEP) – ACEP provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits. Under the Agricultural Land Easements component, NRCS helps Indian tribes, state and local governments and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. Under the Wetlands Reserve Easements component, NRCS helps to restore, protect and enhance enrolled wetlands. https://www.nrcs.usda.gov/wps/portal/nrcs/main/id/programs/easements/acep

Conservation Technical Assistance (CTA) –The CTA provides free technical assistance to help farmers and ranchers identify and solve natural resource problems on their farms and ranches. This might come as advice and counsel, through the design and implementation of a practice or treatment, or as part of an active conservation plan. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/id/programs/?cid=stelprdb1142957

National Grazing Lands Coalition (NatGLC) –The National Grazing Lands Coalition' promotes ecologically and economically sound management of grazing lands. Grants are available that facilitate the following: (1) demonstration of how improved soil health affects grazing lands sustainability (2) establishment of conservation partnerships, leadership and outreach, (3) education of grazing land managers, professionals, youth and the public (4) enhancement of technical capabilities, and (5) improvement in the understanding of the values and multiple services that grazing lands provide. http://www.glci.org/

Conservation Reserve Program (CRP) –The CRP is a land retirement program for blocks of land or strips of land that protect the soil and water resources, such as buffers and grassed waterways. https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/

Conservation Innovation Grants (CIG) –CIG is a voluntary program to stimulate the development and adoption of innovative conservation approaches and technologies for agricultural production. https://www.nrcs.usda.gov/wps/portal/nrcs/main/id/programs/financial/cig/

State Revolving Loan Funds (**SRF) –**These funds are administered through the IDEQ. https://www.deq.idaho.gov/water-quality/grants-loans/water-system-construction-loans.aspx

Conservation Stewardship Program (**CStP) –**CStP is a voluntary program that rewards the Nation's premier farm and ranch land conservationists who meet the highest standards of conservation environmental management. https://www.nrcs.usda.gov/wps/portal/nrcs/main/id/programs/financial/csp

HIP – This is an Idaho Department of Fish and Game program to provide technical and financial assistance to private landowners and public land managers who want to enhance upland game bird and waterfowl habitat. Funds are available for cost-sharing on habitat projects in partnership with private landowners, non-profit organizations, and state and federal agencies. https://idfg.idaho.gov/conservation/habitat/hip

Partners Program in Idaho – This is a U.S. Fish and Wildlife program providing funds for the restoration of degraded riparian areas along streams and shallow wetland restoration. https://www.fws.gov/idaho/articles.cfm?id=149489623

ID Parks & Recreation – The Idaho Department of Parks and Recreation provides a variety of funding programs and grants to government entities in Idaho for the provision of equipment and for the creation and renovation of outdoor recreational facilities. https://parksandrecreation.idaho.gov/grants-and-funding

National Fish and Wildlife Foundation – NFWF provides funding on a competitive basis to projects that sustain, restore, and enhance our nation's fish, wildlife, and plants and their habitats. http://www.nfwf.org/

Sustainable Agriculture Research and Education Grants - Since 1988, SARE has funded more than 5,000 projects with grants for farmers, ranchers, extension agents and educators, researchers, nonprofits, students, communities and others. SARE's mission is to advance—to the whole of American agriculture—innovations that improve profitability, stewardship, and quality of life by investing in groundbreaking research and education. https://www.westernsare.org/

Grants.gov – Large database of federal grant opportunities for a wide variety of topics. www.grants.gov

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